PART II

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[0411] Fig. 4 is a diagram showing the external appearance of the gate terminal 101. In Fig. 4, reference numeral 400 denotes an infrared communication module for infrared communication with a mobile user terminal 100; 401, a 6440 x 480 pixel touch panel liquid crystal display (touch panel LCD); 402, a power switch; 403, number key switches; 404, a menu switch for changing the display on the touch panel LCD 401 to the menu screen; 405, a lock switch for locking the display on the touch panel LCD 401 and the operation of the gate terminal; and 406, a serial cable used to connect the infrared module 400 to the gate terminal. In addition, at the rear of the gate terminal an RS-232C interface is provided for the connection of an external device, such as a gate opening/closing device.

[0412] The gate terminal 101 has two primary operating modes: a ticket examination mode for examining an electronic ticket and a ticket setup mode for setting up an electronic ticket to be examined. To change the operating mode of the gate terminal 101, the menu switch 404 is depressed, which changes the display on the tough panel LCD 401 to the menu screen, and a mode is selected by touching the screen.

[0413] In the ticket examination mode, the gate terminal 101 waits until, using infrared communication, an electronic ticket is presented. When a user employs the mobile user terminal 100 to present an electronic ticket, the gate terminal 101 examines that electronic ticket, exchanges examination information with the mobile user terminal, and displays the results on the screen. The operator (merchant) of the gate terminal permits or bars the entry of the user in accordance with the results displayed on the screen. When a gate opening/closing device is connected as an external device, the gate is opened or closed in accordance with the results of the examination.

[0414] The lock switch 405 is used when the operator (merchant) leaves the gate terminal 101. The operator locks the screen display and the operation of the gate terminal to prevent the illegal operation of the gate terminal. Once the gate terminal has been locked using the lock switch, it can not be unlocked until a password that was set previously is entered.

[0415] In the ticket setup mode, when code information for designating an electronic ticket is entered using the number key switches 403, a program module (ticket examination module) for examining the designated electronic ticket is downloaded from the service system 100, and the electronic ticket to be examined is set up.

[0416] A detailed explanation of the internal structure and the operation of the gate terminal 101 will be given later.

[0417] The merchant terminal 102 will now be described.

[0418] Fig. 5 is a diagram showing the external appearance of the merchant terminal 102 when, for calculating the price of a product, it is connected by an RS-232C cable 514 to a cash register 511.

[0419] In Fig. 5, reference numeral 501 denotes an infrared communication module for engaging in infrared communication with the mobile user terminal 100; 502, a 320 x 240 pixel color liquid crystal display (LCD); 503, a telephone handset; 504, a mode switch used for changing the operating mode of the merchant terminal 102; 506, a function switch; 507, number key switches; 508, an execution switch for permitting the execution of processing for which confirmation by the merchant is required, such as confirmation of the terms of a settlement and confirmation of the reference results obtained; 509, a power switch; 512, a payment card settlement switch for the cash register 511 for designating a settlement process using a payment card; and 513, a credit settlement switch for designating a the settlement process using credit.

[0420] The merchant terminal includes three operating modes: a digital telephone mode, a merchant mode and a merchant information management mode. These modes are changed by manipulating the mode switch 504. The merchant terminal 102 serves as a digital telephone in the digital telephone mode, and as a settlement terminal for an electronic payment card and electronic credit card in the merchant mode. The merchant information management mode is the operating mode for managing merchant information that is stored in the merchant terminal 102. In the merchant information management mode, the merchant refers to the stored merchant information and sets merchant setup information.

[0421] To make a call from the merchant terminal 102, first, the operator (merchant) of the merchant terminal manipulates the mode switch 304 and sets the operating mode to the digital telephone mode, and then enters a phone number using the number key switches 507. Through the above operation, the operator (merchant) can place a call to a destination corresponding to the telephone number that was

entered.

[0422] To receive a call at the merchant terminal 102, the merchant terminal 102 generates a call reception tone, regardless of the current operating mode. Then, simply by raising the telephone handset 503 or depressing the hook switch 505 the operating mode is automatically changed to the telephone mode and the operator (merchant) can answer the call,

[0423] To perform the settlement process, first, the operator (merchant) of the merchant terminal calculates the total charge by adding the price of a product and the tax and transmits it to the user. When the user desires to employ the electronic payment card to make the payment, the operator depresses the payment card settlement switch 512 on the cash register 511. When the user desires to employ the electronic credit card to make the payment, the operator depresses the credit card settlement switch 513 and waits for the user to perform the payment operation at the mobile user terminal 100.

[0424] For the electronic payment card, when the user has performed the payment operation, a message indicating completion of the settlement preparation is displayed on the LCD 502. At this time, the merchant terminal 102 uses infrared communication to exchange settlement information with the mobile user terminal 100, and performs the settlement process using the electronic payment card.

[0425] For the electronic credit card, when the user performs the payment operation, a payment amount entered by the user is displayed on the LCD 502, and then the credit authorization results obtained for the user are displayed. The operator (merchant) confirms the contents and depresses the execution switch 508. Then, a message indicating completion of the settlement setup is displayed on the LCD 502. At this time, the merchant terminal 102 exchanges settlement information with the mobile user terminal 100 and the service system 110, and performs the settlement process using the electronic credit card.

[0426] A detailed explanation of the internal structure and the operation of the merchant terminal 102 will be given later.

[0427] The merchant terminal 103 will now be described.

[0428] Figs. 6A and 6B are a front view and a rear view of the merchant terminal 103.

[0429] In Fig. 6A, reference numeral 600 denotes an infrared communication port (infrared communication module) used when engaging in infrared communication with the mobile user terminal 100; 601, an antenna for receiving and transmitting radio signals for a digital wireless telephone; 602, a receiver loudspeaker; 603, a 180 x 240 pixel color liquid crystal display (LCD); 604, a mode switch for changing the operating mode of the merchant terminal 103; 605, a speech switch for the digital wireless telephone; 606, an end switch for the digital wireless telephone; 607, function switches; 608, number key switches; 609, a microphone; and 610, a bar code reader.

[0430] In Fig. 6B, reference numeral 611 denotes a power switch; 612, an execution switch for permitting the execution of processing that requires the confirmation of the merchant, such as confirmation of the terms of a settlement and confirmation of the results of a credit authorization process; 613, a headphone jack used to connect a headphone set; and 614, a card slot into which is inserted a memory card on which product information is recorded.

[0431] The merchant terminal 103 has three operating modes: a digital wireless telephone mode, a merchant mode, and a merchant information management mode. These modes are changed by manipulating the mode switch 604. The merchant terminal 103 serves as a digital wireless telephone in the digital wireless telephone mode, and as a settlement terminal for an electronic payment card and as an electronic credit card in the merchant mode. The merchant information management mode is the operating mode used for managing merchant information that is stored in the merchant terminal 103. In the merchant information management mode, the merchant refers to the stored merchant information and sets merchant setup information.

[0432] To make a call from the merchant terminal 103, first, the operator (merchant) of the merchant terminal manipulates the mode switch 604 to set the operating mode to the digital telephone mode and enters a phone number using the number key switches 608. Through the above operation, the operator (merchant) can place a call to a destination corresponding to the telephone number that was entered.

[0433] To receive a call at the merchant terminal 103, regardless of the current operating mode, the merchant terminal 102 generates a call reception tone. Then, the operating mode is automatically changed to the telephone mode simply by the depression of the speech switch 605 and the operator (merchant) can answer the call.

[0434] To perform the settlement process, first, the operator (merchant) of the merchant terminal manipulates the mode switch 604 to set the operating mode to the merchant mode. The operator reads the bar code for a product using the bar code reader 610, and depresses the total switch in the number key switches 608 to calculate the total charge. The operator depresses the total switch again to display the results upside down on the LCD 603, so that the total charge is transmitted and is also provided for the user. When the user desires to make payment using the electronic payment card, the operator depresses the F2 switch of the function switches 607. When the user desires to make payment using the electronic credit card, the operator depresses the F3 switch and waits for the user to perform the payment operation at the mobile user terminal 100.

[0435] For the electronic payment card, when the user has performed the payment operation, a message indicating the completion of the settlement preparation is displayed on the LCD 603. At this time, the merchant terminal 103 exchanges settlement information with the mobile user terminal 100 by using infrared communication, and performs the settlement process using the electronic payment card.

[0436] For the electronic credit card, when the user has performed the payment operation, a payment amount entered by the user is displayed on the LCD 603, and then the credit authorization results obtained for the user are displayed. The operator (merchant) confirms the contents and depresses the execution switch 612. Then, a message indicating the completion of the settlement setup is displayed on the LCD 603. At this time, the merchant terminal 103 exchanges settlement information with the mobile user terminal 100 and the service system 110, and performs the settlement process using the electronic credit card.

[0437] A detailed explanation of the internal structure and the operation of the merchant terminal 103 will be given later.

[0438] The automatic vending machine 104 will now be described.

[0439] Fig. 7 is a diagram showing the external appearance of the automatic vending machine 104. In Fig. 7, reference numeral 700 denotes an infrared communication port (infrared communication module) used when engaging in infrared communication with the mobile user terminal 100; 701, an antenna used for receiving and transmitting radio signals for a digital wireless telephone; 702, a 640 x 480 pixel color liquid crystal display touch panel (touch panel LCD); 703, a product discharge port; 704, product selection switches; 705, a sold out display (LED); and 706, a sample.

[0440] To purchase a product from the automatic vending machine 104, a user who owns a mobile user terminal touches "purchase" in the operating menu displayed on the touch panel LCD 702, and then depresses a product selection switch 704 to select a desired product. The automatic vending machine counts the number of products selected, and each time a product selection switch 704 is depressed the product count is increased by one, the total charge is calculated, and the names, the volumes and the total charge for the selected products are displayed, along with a button used to signal the start of a payment operation. When the user touches the button signaling the start of a payment operation, the automatic vending machine 104 displays a message on the touch panel LCD requesting payment using the electronic payment card. Then, when the user pays the amount charged using the mobile user terminal, the product is discharged at the discharge port 703 and a message indicating that the settlement preparation has been completed is displayed on the touch panel LCD. After a short pause, the operating menu is again displayed. At this time, the automatic vending machine 104 uses infrared communication to exchanged settlement information with the mobile user terminal 100, and uses the electronic payment card to perform the settlement process.

[0441] When the user touches "product information" in the operating menu that is displayed on the touch panel LCD 702 and selects a product using a product selection switch 704, the information concerning the selected product is displayed on the touch panel LCD. The information concerning the product is multimedia information, including text, images, video and sound, and sound is output through a loudspeaker that is incorporated in the automatic vending machine 104. Therefore, a CF (Commercial Film) for the product may be output as information concerning the product. Further, when the product is a video, a music CD (Compact Disk) or a packaged media product, such as a software game program, sample

information concerning the product may be output on the touch panel LCD and through the loudspeaker.

[0442] A detailed explanation of the internal structure and the operation of the automatic vending machine 104 will be given later.

[0443] The switching center 105 will now be explained.

[0444] Fig. 8 is a block diagram illustrating the arrangement of the switching center 105. In Fig. 8, reference numeral 800 denotes an electronic telephone card accounting device that uses the electronic telephone card to perform the accounting for telephone communication; 801, a switch for performing the switching for a digital wireless telephone network, and the switching for the digital wireless telephone network and the digital public line network 111; 802, a data processor for encoding and decoding sound and data; 803, a modulator/demodulator for performing a multiplexing process and a modulation/demodulation process; and 804, a base station controller for controlling the base station. The digital communication line 117 is used to connect the switching center 105 to the base station 112. Actually, however, multiple base stations are connected to the switching center 105, and reference numerals 805 and 806 denote digital communication lines that are used to connect to the switching center 105 base stations other than the base station 112. Reference numeral 807 denotes a control signal and a data signal exchanged by the electronic telephone card accounting device 800 and the switch 801.

[0445] The electronic telephone card accounting device 800 is operated in response to the initiation of a communication using the electronic telephone card. When the line connection is established, and while the line is connected (during the communication process), the electronic telephone card accounting device employs accounting information received from the switch 801 to exchange settlement information with the mobile user terminal 100 and to use the electronic telephone card to perform the settlement process. At this time, the switch 801 switches the lines in accordance with the terms of the settlement process that is performed by the electronic telephone card accounting device 800.

[0446] A detailed explanation of the internal structure and the operation of the electronic telephone card accounting device 800 will be given later.

[0447] The service system 110 will now be described.

[0448] Fig. 9 is a block diagram illustrating the arrangement of the service system 110. For the mobile electronic commerce service, the service system 110 processes various types of transaction information that is exchanged with the mobile user terminal 100, the gate terminal 101, the merchant terminal 102, the merchant terminal 103, the automatic vending machine 104, the switching center 105 (the electronic telephone card accounting device 800), the transaction processing system 106, the ticket issuing system 107, the payment card issuing system 108, and the telephone card issuing system 109. The service system 100 comprises: a service server 900, for controlling data communication; a service director information server 901, for managing attribute information that concerns the user, the merchant, the communication provider, the transaction processor, the ticket issuer, the payment card issuer and the telephone card issuer and for managing the history information for the service provided by the service system 110; a user information server 902, for managing the user attribute information and the data stored in the mobile user terminal 100; a merchant information server 903, for managing the attribute information for the merchant and the communication provider and for managing data that are stored in the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104 and the electronic telephone card accounting device 800; a transaction processor information server 904, for managing the attribute information for the transaction processor and the history information of the settlement process; a ticket issuer information server 905, for managing the attribute information of the ticket issuer, the history information of the ticket issuing process and a template program for the electronic ticket; a payment card issuer information server 906, for managing the attribute information for the payment card issuer, the history information for the payment card issuing process and a template program for the electronic payment card; a telephone card issuer information server 907, for managing the attribute information for the telephone card issuer, the history information for the telephone card issuing process and a template program for the electronic telephone card; and a management system 908, with which the service provider manages the operation of the service system 110. The servers 900 to 907 and the management system 908 are constituted by one or more computers.

[0449] The service server 900, the service director information server 901, the user information server 902, the merchant information server 903, the transaction processor information server 904, the ticket issuer

information server 905, the payment card issuer information server 906, and the telephone card issuer information server 907 are respectively connected to an ATM-LAN switch 909 by ATM-LAN cables 914, 915, 916, 917, 918, 919, 920 and 921. The service server 900 accesses, through the ATM-LAN switch 909, the service director information server 901, the user information server 902, the merchant information server 903, the transaction processor information server 904, the ticket issuer information server 905, the payment card issuer information server 906, and the telephone card issuer information server 907.

[0450] The ATM-LAN switch 909 is connected to an ATM switch 911 by an ATM-LAN cable 912. The digital communication line 130 for connecting the digital public line network 111, the digital communication line 131 for connecting the transaction processing system 106, the digital communication line 132 for connecting the ticket issuing system 107, the digital communication line 133 for connecting the payment card issuing system 108, and the digital communication line 134 for connecting the telephone card issuing system 108 are extended to the ATM switch 911. The service server 900 communicates, via the ATM-LAN switch 909 and the ATM switch 911, with the mobile user terminal 100, the gate terminal 101, the merchant terminal 102, the merchant terminal 103, the automatic vending machine 104, the electronic telephone card accounting device 800, the transaction processing system 106, the ticket issuing system, the payment card issuing system and the telephone card issuing system.

[0451] The management system 908 is connected to the ATM-LAN switch 910 by an ATM-LAN cable 922, and also connected to the ATM switch 911 by an ATM-LAN cable 913. In order to manage the operation of the service system 110, the management system 908 accesses the service server 900, the service director information server 901, the user information server 902, the merchant information server 903, the transaction processor information server 904, the ticket issuer information server 905, the payment card issuer information server 906 and the telephone card issuer information server 907 through the ATM-LAN switch 910, the ATM switch 911 and the ATM-LAN switch 909.

[0452] The ATM switch 911 serves as a data communication switch (router) for communication between the outside and the inside of the service system 110, and for service system 110 intercommunication. In addition, the ATM switch 911 serves as a communication adaptor for handling multiple communication systems. For example, when communication is established between the service server 900 and the merchant terminal 102, the merchant terminal 102 and the ATM switch 911 exchange ISDN data packets. The ATM switch 911 converts the ISDN data packets to ATM packets, or vice versa, and exchanges the ATM packets with the service server 900. Similarly, when communication is established between the service server 900 and the mobile user terminal 100, between the service server 900 and the merchant terminal 103, between the service server 900 and the automatic vending machine 104, between the service server 900 and the electronic telephone card accounting device 800, between the service server 900 and the transaction processing system 106, between the service server 900 and the ticket issuing system 107, between the service server 900 and the telephone card issuing system 109, and between the service server 900 and the payment card issuing system 108, the ATM switch 911 performs communication data conversions in accordance with the individual communication systems.

[0453] In order to reduce the communication charges incurred by the service system 110 when communicating with the mobile user terminal 100, the gate terminal 101, the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800, generally the service system 110 is installed in each area (service area) wherein the mobile electronic commerce service is provided. Therefore, a special digital communication line 923 is connected to the ATM switch 911 to establish a connection with a service system in another area. In this case, the service systems share the data and interact with each other for data processing.

[0454] The transaction processing system 106 will now be explained.

[0455] Fig. 10 is a block diagram illustrating the arrangement of the transaction processing system 106. The transaction processing system 106 comprises: a transaction process server 1000 for processing settlement information that is exchanged with the service system 110 for an electronic credit card service; a subscriber information server 1001, for managing personal information for a subscriber to the credit service; a member store information server 1002, for managing the information for a store that is a member of the credit service; a transaction information server 1003, for managing the transaction information for a credit settlement; and a management system 1006, with which the transaction processor manages the operation of the transaction processing system 106. The servers 1000 to 1003 and the management system 1006 are constituted by one or more computers.

[0456] The transaction server 1000, the subscriber information server 1001, the member store information server 1002, and the transaction information server 1003 are respectively connected to an ATM-LAN switch 1004 by ATM-LAN cables 1008, 1009, 1010 and 1011. The transaction server accesses, via the ATM-LAN switch 1004, the subscriber information server 1001, the member store information server 1002, or the transaction information server 1003.

[0457] The ATM-LAN switch 1004 is connected to an ATM switch 1005 by an ATM-LAN cable 1013. The digital communication line 131 for establishing a connection with the service system 110 is connected to the ATM switch 1005. The transaction server communicates with the service system 110 via the ATM-LAN switch 1004 and the ATM switch 1005.

[0458] In the electronic credit card service, the credit settlement process performed by the transaction processing system 106 is established when, upon receiving a settlement request from the service system 110, the transaction server 1000 updates information for the subscriber information server 1001, the member store information server 1002 and the transaction information server 1003.

[0459] The ATM switch 1005 is extended not only to the digital communication line 131 for effecting a connection with the service system 110, but also a bank dedicated line 1015 for connecting a bank on-line system, and a dedicated digital line 1016 for connecting the transaction processing system of another transaction processor. The transaction processing system 106 communicates with the bank on-line system and the transaction processing system of another transaction processor, and performs a settlement process between financial institutions.

[0460] The management system 1006 is connected to the ATM-LAN switch 1007 by an ATM-LAN cable 1012, and is also connected to the ATM switch 1005 by an ATM-LAN cable 1014. In order to manage the operation of the service system 110, the management system 1006 accesses the transaction server 1000, the subscriber information server 1001, the member store information server 1002, or the transaction information server 1003 via the ATM-LAN switch 1007, the ATM switch 1005 and the ATM-LAN switch 1004.

[0461] The ATM switch 1005 serves as a data communication switch (router) for communication between the outside and the inside of the transaction processing system 106, and for transaction processing system 106 intercommunication. In addition, the ATM switch 1005 serves as a communication adaptor for handling multiple communication systems. For communication between the transaction server 1000 and the service system 110, between the transaction server 1000 and the bank on-line system, and between the transaction server 1000 and the transaction processing system of another transaction processor, the ATM switch 1005 converts communication data in accordance with the individual communication systems.

[0462] The ticket issuing system 107 will now be explained.

[0463] Fig. 11 is a block diagram illustrating the arrangement of the ticket issuing system 107. The ticket issuing system 107 comprises: a ticket issuing server 1100, for processing settlement information (transaction information) that is exchanged with the service system 110 of the electronic ticket service; a customer information server 1101, for managing the purchase history information for a customer; a ticket issuing information server 1102, for managing information concerning a ticket that has been issued and an installation card; a ticket information server 1103, for managing ticket stock information; and a management system 1106, with which the ticket issuer manages the operation of the ticket issuing system 107. The servers 1100 to 1103 and the management system 1106 are constituted by one or more computers.

[0464] The ticket issuing server 1100, the customer information server 1101, the ticket issuing information server 1102, and the ticket information server 1103 are respectively connected to an ATM-LAN switch 1104 by ATM-LAN cables 1108, 1109, 1110 and 1111. The ticket issuing server accesses, via the ATM-LAN switch 1104, the customer information server 1101, the ticket information server 1102, or the ticket information server 1103.

[0465] The ATM-LAN switch 1104 is connected to an ATM switch 1105 by an ATM-LAN cable 1113. The digital communication line 132 for connecting the service system 110 is connected to the ATM switch 1105. The ticket issuing server communicates with the service system 110 via the ATM-LAN switch 1104 and the ATM switch 1105.

[0466] In the electronic ticket service, the ticket issuing process performed by the ticket issuing system 107

is established when, upon receiving a request from the service system 110, the ticket issuing server 1100 updates information for the customer information server 1101, the ticket issuing information server 1102 and the ticket information server 1103, and transmits to the service system 110 the ticket information that is to be issued.

[0467] The management system 1106 is connected to the ATM-LAN switch 1107 by an ATM-LAN cable 1112, and is also connected to the ATM switch 1105 by an ATM-LAN cable 1114. In order to manage the operation of the ticket issuing system 107, the management system 1106 accesses the ticket issuing server 1100, the customer information server 1101, the ticket issuing information server 1102, or the ticket issuing information server 1103 via the ATM-LAN switch 1107, the ATM switch 1105 and the ATM-LAN switch 1104.

[0468] The ATM switch 1105 serves as a data communication switch (router) for communication between the outside and the inside of the ticket issuing system 107 and for ticket issuing system 107 intercommunication.

[0469] The payment card issuing system 108 will now be explained.

[0470] Fig. 12 is a block diagram illustrating the arrangement of the payment card issuing system 108. The payment card issuing system 108 comprises: a payment card issuing server 1200, for processing settlement information (transaction information) that is exchanged with the service system 110 of the electronic payment card service; a customer information server 1201, for managing the purchase history information for a customer; a payment card issuing information server 1202, for managing information concerning a payment card that has been issued and an installation card; a payment card information server 1203, for managing payment card stock information; and a management system 1206, with which the payment card issuer manages the operation of the payment card issuing system 108. The servers 1200 to 1203 and the management system 1206 are constituted by one or more computers.

[0471] The payment card issuing server 1200, the customer information server 1201, the payment card issuing information server 1202, and the payment card information server 1203 are respectively connected to an ATM-LAN switch 1204 by ATM-LAN cables 1208, 1209, 1210 and 1211. The payment card issuing server accesses, via the ATM-LAN switch 1204, the customer information server 1201, the payment card information server 1202, or the payment card information server 1203.

[0472] The ATM-LAN switch 1204 is connected to an ATM switch 1205 by an ATM-LAN cable 1213. The digital communication line 133 for connecting the service system 110 is connected to the ATM switch 1205. The payment card issuing server communicates with the service system 110 via the ATM-LAN switch 1204 and the ATM switch 1205.

[0473] In the electronic payment card service, the payment card issuing process performed by the payment card issuing system 108 is established when, upon receiving a request from the service system 110, the payment card issuing server 1200 updates information for the customer information server 1201, the payment card issuing information server 1202 and the payment card information server 1203, and transmits the payment card information that is to be issued to the service system 110.

[0474] The management system 1206 is connected to the ATM-LAN switch 1207 by an ATM-LAN cable 1212, and is also connected to the ATM switch 1205 by an ATM-LAN cable 1214. In order to manage the operation of the payment card issuing system 108, the management system 1206 accesses the payment card issuing server 1200, the customer information server 1201, the payment card issuing information server 1202, or the payment card issuing information server 1203 via the ATM-LAN switch 1207, the ATM switch 1205 and the ATM-LAN switch 1204.

[0475] The ATM switch 1205 serves as a data communication switch (router) for communication between the outside and the inside of the payment card issuing system 108 and for payment card issuing system 108 intercommunication.

[0476] The telephone card issuing system 109 will now be explained.

[0477] Fig. 13 is a block diagram illustrating the arrangement of the telephone card issuing system 109. The telephone card issuing system 109 comprises: a telephone card issuing server 1300, for processing settlement information (transaction information) that is exchanged with the service system 110 of the

electronic telephone card service; a customer information server 1301, for managing the purchase history information for a customer; a telephone card issuing information server 1302, for managing information concerning a telephone card that has been issued and an installation card; a telephone card information server 1303, for managing telephone card stock information; and a management system 1306, with which the telephone card issuer manages the operation of the telephone card issuing system 109. The servers 1300 to 1303 and the management system 1306 are constituted by one or more computers.

[0478] The telephone card issuing server 1300, the customer information server 1301, the telephone card issuing information server 1302 and the telephone card information server 1303 are respectively connected to an ATM-LAN switch 1304 by ATM-LAN cables 1308, 1309, 1310 and 1311. The telephone card issuing server accesses, via the ATM-LAN switch 1304, the customer information server 1301, the telephone card information server 1302, or the telephone card information server 1303.

[0479] The ATM-LAN switch 1304 is connected to an ATM switch 1305 by an ATM-LAN cable 1313. The digital communication line 134 for connecting the service system 110 is connected to the ATM switch 1305. The telephone card issuing server communicates with the service system 110 via the ATM-LAN switch 1304 and the ATM switch 1305.

[0480] In the electronic telephone card service, the telephone card issuing process performed by the telephone card issuing system 109 is established when, upon receiving a request from the service system 110, the telephone card issuing server 1300 updates information for the customer information server 1301, the telephone card issuing information server 1302 and the telephone card information server 1303, and transmits the telephone card information that is to be issued to the service system 110.

[0481] The management system 1306 is connected to the ATM-LAN switch 1307 by an ATM-LAN cable 1312, and is also connected to the ATM switch 1305 by an ATM-LAN cable 1314. In order to manage the operation of the telephone card issuing system 109, the management system 1306 accesses the telephone card issuing server 1300, the customer information server 1301, the telephone card issuing information server 1302, or the telephone card issuing information server 1303 via the ATM-LAN switch 1307, the ATM switch 1305 and the ATM-LAN switch 1304.

[0482] The ATM switch 1305 serves as a data communication switch (router) for communication between the outside and the inside of the telephone card issuing system 109 and for telephone card issuing system 109 intercommunication.

[0483] Fig. 14 is a schematic diagram for an installation card for an electronic payment card, an electronic telephone card, or an electronic ticket. Figs. 14A and 14B are diagrams showing the reverse side and the obverse side of an installation card 1400 for an electronic payment card; Figs. 14C and 14D are diagrams showing the reverse side and the obverse side of an installation card 1400 for an electronic telephone card; and Figs. 14E and 14F are diagrams showing the reverse side and the obverse side of an installation card 1400 for an electronic ticket.

[0484] Basically, installation information and information required for installation, such as installation procedures, are printed on the reverse side of the installation card, and a desired design is printed on the obverse side.

[0485] For example, the installation card 1400 for the electronic payment card represents a value of 10,000 (a currency unit, or a unit or a product, or a service to be provided).

[0486] On the reverse side are printed an installation card type 1403, a numerical value 1404 representing the worth of an electronic payment card to be installed; installation procedures 1405; a holographic logo 1406; an installation card number 1407, which represents the type of electronic payment card that is to be installed; and an installation number 1408, which corresponds to an identification number in the same type of electronic payment card.

[0487] The holographic logo 1406, which is difficult to copy, is provided not only for the design but also to prevent the counterfeiting of the installation card. Therefore, to prevent counterfeiting, a micro character or a micro pattern may be printed instead of the holographic logo 1406.

[0488] The installation card number 1407 consists of an arbitrary 8-digit number that represents the electronic payment card type, and is printed as two sets of four numerals each. The installation number

1408 consists of an arbitrary 32-digit number that is selected at random, and is printed as sets of four numerals each that are arranged in four rows and two columns. The combination of the installation card number 1407 and the installation number 1408 constitutes the relevant identification information for the electronic payment card that is to be installed. In order to prevent the leakage of identification information during distribution, a coating is applied to the portion whereon the installation card number 1407 and the installation number 1408 are printed, and the coating must be scratched off before the numbers can be seen. That is, when the installation card is sold or transferred the applied coating is intact, and the coating is not scratched off until the electronic payment card is installed in the mobile user terminal 100.

[0489] During the installation procedures, first, the coating (scratch portion) is removed. Then, the mobile user terminal 100 is set to the payment card mode and the operating menu for the payment card mode is displayed using the function switch (F4). When the menu is selected, the installation screen is displayed. Following this, the installation card number and the installation number are entered and the execution switch is pressed. Through the performance of this operation, installation information is exchanged by the mobile user terminal 100 and the service system 110, and the electronic payment card is installed in the mobile user terminal 100.

[0490] For the installation card 1401 for the electronic telephone card a value of 5,000 (a currency unit, or a unit of the wireless telephone communication service that is to be provided) is indicated. In the same manner as for the installation card 1400 for the electronic payment card, on the reverse side are printed an installation card type 1409, a numerical value 1410 that represents the worth of an electronic telephone card to be installed; installation procedures 1411; a holographic logo 1412; an 8-digit installation card number 1413 that represents the type of electronic telephone card that is to be installed; and a 32-digit installation number 1414 that corresponds to an identification number for the same type of electronic telephone card. The coating is applied to the portion whereon the installation card number 1413 and the installation card number 1414 are printed.

[0491] During the installation procedures, first, the coating (scratch portion) is removed. Then the mobile user terminal is set to the telephone card mode and the operating menu of the telephone card mode is displayed by using the function switch (F4). When the menu is selected, the installation screen is displayed. Following this, the installation card number and the installation number are entered, and the execution switch is pressed. Through the performance of this operation, installation information is exchanged by the mobile user terminal 100 and the service system 110, and the electronic telephone card is installed in the mobile user terminal 100.

[0492] For an installation card 1402 for an electronic ticket, information concerning the contents of an electronic ticket to be installed, such as the date and place of an event, is printed on the obverse side. And as for the installation card 1400 for the electronic payment card, on the reverse side are printed an installation card type 1415; installation procedures 1417; a holographic logo 1418; an 8-digit installation card number 1419 that represents the type of an electronic ticket to be installed; and a 32-digit installation number 1420 that corresponds to an identification number for the same type of electronic ticket. The coating is applied to the portion whereon the installation card number 1419 and the installation card number 1420 are printed. In addition, an installation limit 1416 for an electronic ticket is printed on the reverse side of the installation card 1402 for the electronic ticket.

[0493] During the installation procedures, first, the coating (scratch portion) is removed. Then, the mobile user terminal is set to the ticket mode and the operating menu for the ticket mode is displayed by using the function switch (F4). When the menu is selected, the installation screen is displayed. Following this, the installation card number and the installation number are entered and the execution switch is depressed. Through the performance of this operation, installation information is exchanged by the mobile user terminal 100 and the service system 110, and the electronic ticket is installed in the mobile user terminal 100.

[0494] In the above description, the installation card has the shape of a card composed of paper, plastic or vinyl chloride. However, any shape can be employed so long as it can be handled by normal distribution channels and so long as installation information that corresponds to the installation card number and the installation number can be recorded thereon. A desired form can be employed to record the installation information. For example, in printed material, such as a book or a magazine, installation information may be recorded on one of the pages, or installation information may be printed on the surface or the label of a three-dimensional product, such as a beverage can. Further, the installation information may be recorded as electronic information in a software package, such as a computer software program.

[0495] When an installation card and another product are combined, the two can be employed as a lottery prize, or can be distributed and sold as a composite product. Further, the distribution costs for the installation card can be reduced, its range of usage can be expanded, and its popularity can be increased.

[0496] An explanation will now be given for the hierarchial data management function performed between the service system 110 and the mobile user terminal 100, the gate terminal 101, the merchant terminal 102, the merchant terminal 103, the automatic vending machine 104, or the electronic telephone card accounting device 800.

[0497] Since the system of the invention handles information concerning a money transaction, such as the purchase of an electronic payment card and the settlement process performed using that card, high security is required. It is one object of this system to provide a simple operation that makes it possible for an ordinary user to handle information at a high level of security and in a mobile environment.

[0498] To implement this system function, the service system 110 manages the data stored in the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, and the electronic telephone card accounting device 800. The service system 110 stores master data for the data stored in the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, and the electronic telephone card accounting device 800. Periodically, the data are mutually updated by the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104 and the electronic telephone card accounting device 800, and the service system 110. At this time, the service system 110 compares the master data with the data stored in the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104 and the electronic telephone card accounting device 800, and determines whether an illegal alteration has been performed. The internal data are updated so that information that is frequently accessed, or comparatively new information is stored on the local storage medium (a RAM or a hard disk) belonging to the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, or the electronic telephone card accounting device 800.

[0499] With this function, an illegal act by a user or a merchant can be prevented, and the loss of data due to an accident can be prevented, thereby increasing the safety of the system. In addition, the owners of the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, and the electronic telephone card accounting device 800 do not have to back up internally stored data, and only a small memory capacity is required for the local storage medium for the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, or the electronic telephone card accounting device 800. As a result, the manufacturing costs and the sizes of these devices can be reduced. Hereinafter, this function is called a network hierarchial storage and management function.

[0500] When the mobile user terminal 100, the gate terminal 101 and the merchant terminals 102 and 103 access the data stored in the service system 110, the network hierarchial storage and management function downloads the data from the service system 110. The data updating process is a process whereby the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, or the electronic telephone card accounting device 800 periodically accesses the service system to update internally stored data. The forcible data updating process is a process whereby the service system forcibly updates the data stored in the mobile user terminal 100, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104, or the electronic telephone card accounting device 800. The data backup process is a process whereby the mobile user terminal 100 or the merchant terminal 103 automatically makes a backup of the internal data in the service system when the remaining battery power is reduced to a specific level.

[0501] In Fig. 56A is shown the remote access processing performed by the mobile user terminal 100 and the service system 110.

[0502] To access data in the service system, the mobile user terminal 100 transmits to the service system a remote access request 5600, which is a data request message. Upon receiving the remote access request 5600, the service system generates remote access data 5601, which is a message that includes the requested data, and transmits it to the mobile user terminal 100. The mobile user terminal 100 then accesses the received data.

[0503] Similarly, in Fig. 57A is shown the remote access processing performed by the service system 110 and the gate terminal 101, or the merchant terminal 102 or 103.

[0504] To access data in the service system, the gate terminal 101 (or the merchant terminal 102 or 103) transmits to the service system a remote access request 5700, which is a data request message. Upon receiving the remote access request 5700, the service system generates remote access data 5701, which is a message that includes the requested data, and transmits it to the gate terminal 101 (the merchant terminal 102 or 103). The gate terminal 101 (the merchant terminal 102 or 103) then accesses the received data.

[0505] In Fig. 56B is shown the data update processing performed by the mobile user terminal 100 and the service system 110.

[0506] When a time designated in advance by the service system is reached, the mobile user terminal 100 transmits to the service system 110 a data update request 5602, which is a message requesting the performance of a process for updating the internal data. The service system 110 generates a data update response 5603, which is a message indicating the range of the data that is to be uploaded to the service system, and transmits it to the mobile user terminal 100.

[0507] The mobile user terminal 100 generates the data to be uploaded to the service system, and transmits to the service system upload data 5604, which is a message for the uploading of the internal data of the mobile user terminal to the service system.

[0508] The service system examines the received data, generates data to update the internal data of the mobile user terminal 100, and transmits to the mobile user terminal 100 update data 5605, which is a message for the updating of the internal data held by the mobile user terminal 100. Upon receiving the update data 5605, the mobile user terminal 100 updates the internal data.

[0509] When the service system discovers an illegal alteration in the downloaded data, instead of the update data 5605 the service system transmits a mandatory expiration 5605', which is a message for the halting of the function of the mobile user terminal.

[0510] Likewise, in Fig. 57B is shown the data updating processing performed by the service system 110 and the gate terminal 101, the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800.

[0511] When the time designated in advance by the service system is reached, the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800) transmits to the service system 110 a data update request 5702, which is a message requesting the performance of the process for updating the internal data. The service system 110 generates a data update response 5703, which is a message indicating the range of the data to be uploaded to the service system, and transmits it to the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800).

[0512] The gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800) generates the data to be uploaded to the service system, and transmits to the service system upload data 5704, which is a message for the uploading of the internal data to the service system 110.

[0513] The service system examines the downloaded data, generates data to update the internal data of the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800), and transmits update data 5705, which is a message for the updating of the internal data, to the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800). Upon receiving the update data 5705, the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800) updates the internal data.

[0514] When the service system discovers an illegal alteration in the downloaded data, instead of the update data 5705 the service system transmits a mandatory expiration 5705', which is a message for the halting of the function of the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending

machine 104, or the electronic telephone card accounting device 800).

[0515] In Fig. 56C is shown the forcible data updating processing performed by the mobile user terminal 100 and the service system 110.

[0516] When internal data belonging to the mobile user terminal 100 must be updated quickly because, for example, the terms of a contract with a user have been changed, first, the service system 110 generates a data update instruction 5606, which is a message instructing the mobile user terminal 100 to perform the forcible data updating process, and transmits it to the mobile user terminal 100.

[0517] The mobile user terminal 100 generates data to be uploaded to the service system, and transmits, to the service providing system, upload data 5607, which is a message directing the uploading of the internal data held by the mobile user terminal.

[0518] The service system examines the downloaded data, generates data for updating the mobile user terminal 100 and transmits to the mobile user terminal 100 update data 5608, which is a message directing the updating of the data held by the mobile user terminal 100. Upon receiving the update data 5608 the mobile user terminal 100 updates the internal data.

[0519] When the service system discovers an illegal alteration in the downloaded data, instead of the update data 5608 the service system transmits a mandatory expiration 5608', which is a message for the halting of the function of the mobile user terminal.

[0520] In Fig. 57C is shown the forcible data updating processing performed by the service system 110 and the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800).

[0521] When the data held by the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800) must be updated quickly because, for example, the terms of a contract with a user have been changed, first, the service system 110 generates a data update instruction 5706, which is a message instructing the performance of the forcible data updating process by the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104, or the electronic telephone card accounting device 800), and transmits it to the mobile user terminal 100.

[0522] The gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800), generates data to be uploaded to the service system, and transmits upload data 5707, which is a message for uploading the internal data to the service system 100, and transmits it to the service system.

[0523] The service system examines the downloaded data, generates data for updating the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800), and transmits update data 5708, which is a message for updating the data held by the mobile user terminal 100, to the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800). The gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800) receives the update data 5708 and updates the internal data.

[0524] When the service system discovers an illegal alteration in the downloaded data, instead of the update data 5708 the service system transmits a mandatory expiration 5708', which is a message for the halting of the function of the gate terminal 101 (the merchant terminal 102 or 103, the automatic vending machine 104 or the electronic telephone card accounting device 800).

[0525] In Fig. 56D is shown the data backup processing performed by the mobile user terminal 100 and the service system 110. The data backup process is performed substantially in the same manner as for the data updating process. It should be noted, however, that the mobile user terminal 100 begins the data backup process when the remaining battery capacity is reduced until it is equal to or lower than Q, and further, that after the mobile user terminal 100 receives update data 5612 and updates the internal data, the mobile user terminal 100 prohibits the entry of new data until an adequate battery capacity has been attained.

[0526] Similarly, in Fig. 57D is shown the data backup processing performed by the merchant terminal 103 and the service system 110. The data backup process is also performed substantially in the same manner as is the data updating process. It should be noted, however, that the merchant terminal 103 begins the data backup process when the remaining battery capacity is reduced until it is equal to or lower than Q, and further, that after the merchant terminal 103 receives update data 5712 and updates the internal data, the merchant terminal 103 prohibits the entry of new data until an adequate battery capacity has been attained.

[0527] A detailed explanation will be given later for the contents of the messages that are exchanged by the devices during the individual processes performed by the above network hierarchial storing and management function.

[0528] An explanation will now be given for the management of an electronic ticket, an electronic payment card, and an electronic telephone card that are issued.

[0529] In this system, the electronic ticket, the electronic payment card, and the electronic telephone card are managed separately, since while one will be registered another will not. Registration in this case means that a user registers, with the service system, an electronic ticket, an electronic payment card, or an electronic telephone card that he or she will use personally.

[0530] Since in this system an electronic ticket, an electronic payment card, or an electronic telephone card that has been purchased can be transferred to another user, a purchaser does not always use what he or she has bought. In particular, a large number of electronic payment cards or electronic telephone cards, such as magnetic telephone cards, are expected to be maintained in the sleeping state and not used.

[0531] If an unused electronic ticket, an unused electronic payment card and an unused electronic telephone card are managed in the same manner as those that are to be used, the system operation is very wasteful. Therefore, this system manages the tickets or cards that are to be used and those that are not to be used separately.

*[0532] Specifically, the electronic ticket, electronic payment card or electronic telephone card that is purchased or transferred is managed by the user information server 902 of the service system 110, while it is regarded as being owned by the user. Before the user employs the electronic ticket, electronic payment card or electronic telephone card, he or she registers it with the service system. The service system registers, in the service director information server 901, the electronic ticket, electronic payment card or electronic telephone card as one that is being used by the user. The registration process can be performed any time and anywhere by employing digital wireless telephone communication.

[0533] A detailed explanation will be given later for the registration of an electronic ticket, an electronic payment card, or an electronic telephone card.

[0534] The mobile electronic commerce services provided by the system of the invention will now be explained.

[0535] Of the four services, an electronic ticket service will be described first.

[0536] The electronic ticket service mainly includes ten different processes: ticket order, ticket purchase, ticket registration, ticket setup, ticket examination, ticket reference, ticket transfer, electronic ticket installation, ticket modification, and ticket refund.

[0537] The ticket order process is a process whereby a user applies for an electronic ticket to the ticket issuer. The ticket purchase process is a process whereby the user purchases the electronic ticket applied for through the ticket order. The ticket registration process is a process whereby a user registers, with the service system, a ticket that he or she has purchased or has been given. The ticket setup process is a process whereby an operator (merchant) of a gate terminal 101 sets up a ticket for examination at the gate terminal. The ticket reference process is a process whereby the gate terminal queries the service system concerning the validity of an electronic ticket that is examined. The ticket transfer process is a process whereby an electronic ticket is transferred. The electronic ticket installation process is a process whereby an electronic ticket is installed in the mobile user terminal 100 using an electronic ticket installation card. The ticket modification process is a process whereby the ticket issuer changes the contents of a ticket that

has been issued. And the ticket refund process is a process whereby the cost of a ticket, calculated while taking into consideration any alterations to the ticket, is refunded.

[0538] In Fig. 58 is shown the ticket order processing.

[0539] First, the user sets the mobile user terminal 100 to the ticket mode and uses the function switch (F4) to display the operating menu for the ticket mode. The user then selects "ticket purchase," and the ticker order screen is displayed on the LCD. Following this, the user employs the function switch 307 and the number key switch 308 to select a ticket issuer and to enter an order code for a desired ticket, a desired date and a desired number of tickets, and depresses the execution switch 311 (ticket order operation 5800). The mobile user terminal transmits, to the service system, a ticket order 5801, which is a message used to apply for an electronic ticket. Upon receiving the ticket order 5801, the service system transmits, to the ticket issuing system 107, a ticket order 5802, which is a message for applying for a ticket.

[0540] Upon receiving the ticket order 5802 at the ticket issuing system, the ticket issuing server 1100 employs the customer information in the customer information server 1101 and the information concerning the ticket issuance condition in the ticket information server 1103, and generates a ticket order response 5803, which is a response message for the ticket order 5802. Thereafter, the ticket order response 5803 is transmitted to the service system.

[0541] When the ticket that the user desires can be issued, the ticket order response 5803 includes a seat number for the ticket to be issued and a ticket sales offer (ticket sales offer), which conveys the price quoted for the ticket. When the ticket that the user desires can not be issued, the ticket sales offer is not included.

[0542] Upon receiving the ticket order response 5803, the service system generates a ticket order response 5804, which is a response message for the ticket order 5801, and transmits it to the mobile user terminal.

[0543] Upon receiving the ticket order response 5804, the mobile user terminal displays the contents of the ticket order response 5804 on the LCD 303 (display of the ticket order response: 5805). When the ticket sales offer is included in the ticket order response 58034, the ticket sales offer is displayed on the LCD. When the ticket sales offer is not included, a message indicating the ticket can not be issued (response message 9016: Fig. 90B) is displayed on the LCD.

[0544] In Fig. 59 is shown the ticket purchase processing.

[0545] The ticket purchase processing is initiated when the ticket sales offer is displayed on the LCD as the result of the ticket order process.

[0546] The ticket sales offer includes two operating menus: "purchase" and "cancel." When "cancel" is selected, the ticket sales offer is canceled. When "purchase" is selected, the purchase order screen appears on the LCD. On the purchase order screen the user designates a credit card to be used for payment and the number of payments, enters a code number, and depresses the execution switch 311 (ticket purchase order operation 5900). Then, the mobile user terminal transmits, to the service providing system, a ticket purchase order 5901, which is an order message for the purchase of an electronic ticket. Upon receiving the ticket purchase order 5901, the service providing system transmits, to the ticket issuing system 107, a ticket purchase order 5902, which is an order message for the purchase of a ticket.

[0547] Upon the ticket purchase order 5902 being received by the ticket issuing system, the ticket issuing server 1100 updates the data in the customer information server 1101, in the ticket issuing information server 1102, and in the ticket information server 1103. The ticket issuing server 1100 generates ticket data for the ordered ticket, and transmits, to the service providing system, an electronic ticket issuing commission 5903, which is a message requesting the issuance of a corresponding electronic ticket and the establishment of a ticket price.

[0548] Upon receiving the electronic ticket issuing commission 5903, the service providing system transmits, to the transaction processing system, a clearing request 5904, which is a message requesting the clearance of the price of the ticket.

[0549] Upon the clearing request 5904 being received by the transaction processing system, the transaction server 1000 updates data in the subscriber information server 1001, in the member store

information server 1002 and in the transaction information server 1003, performs a clearing process for the credit card, and transmits to the service providing system a clearing completion notification 5905, which is a message indicating the clearing process has been completed.

[0550] Upon receiving the clearing completion notification 5905, the service providing system generates a clearing completion notification 5906, which is a message indicating the clearing process has been completed, and transmits it to the ticket issuing system. In addition, the service providing system generates an electronic ticket to be issued to the user.

[0551] Upon receiving the clearing completion notification 5906, the ticket issuing system generates and transmits to the service providing system a receipt 5907, which is a message corresponding to the receipt of the ticket sale.

[0552] Based on the received receipt 5907, the service providing system generates a receipt 5909, which is a receipt message for the user, and transmits it to the mobile user terminal, together with an electronic ticket issuance message 5908 that includes the electronic ticket that is generated.

[0553] Upon receiving the electronic ticket issuance message 5908 and the receipt 5909, the mobile user terminal displays the purchased electronic ticket on the LCD (display the electronic ticket: 5910). At this time, a dialogue message is also displayed on the LCD to register the electronic ticket that has been purchased. When the user selects "register," the mobile user terminal initiates the ticket registration process.

[0554] The ticket registration processing is shown in Fig. 65A.

[0555] The ticket registration process is begun when the dialogue message is displayed on the LCD to register an electronic ticket for use. To display the dialogue message for the registration for use, the execution switch 311 is depressed immediately after the electronic ticket is purchased, or while an electronic ticket that has not yet been registered is displayed ("unregistered" is displayed for the state of the ticket).

[0556] The dialogue message for registration has two operating menus: "register" and "cancel." When the user selects "cancel," the ticket registration process is canceled. When the user selects "register" (registration operation for an electronic ticket: 6500), the mobile user terminal transmits, to the service providing system, a ticket registration request 6501, which is a message requesting the registration of an electronic ticket. In the service providing system, the service server 900 compares the contents of the received ticket registration request 6501 with the user information in the user information server 902. The service server 900 updates the management information that is stored in the service director information server 901 for an electronic ticket that has been registered. The service server 900 registers the electronic ticket, and transmits, to the mobile user terminal, a ticket certificate issuance message 6502 that includes a certificate for the registered electronic ticket.

[0557] Upon receiving the ticket certificate 6502, the mobile user terminal displays the registered electronic ticket on the LCD ("registered" is displayed as the state of the ticket) (display a registered ticket: 6503).

[0558] The examination target ticket processing is shown in Fig. 66.

[0559] The gate terminal 101 may perform the data updating processing to set up an electronic ticket for examination. In this embodiment, however, the merchant sets up a target ticket.

[0560] First, the operator (merchant) of the gate terminal 101 sets the gate terminal to the ticket setup mode, and displays the setup screen on the touch panel LCD 401. The operator (merchant) then employs the number key switch 403 to enter the ticket code that designates the electronic ticket that is to be set up for the gate terminal, and presses the "set" button on the screen (ticket setup operation 6600). Then, the gate terminal transmits, to the service providing system, a ticket setup request 6601, which is a message requesting the setup of the designated electronic ticket.

[0561] Upon receiving the ticket setup request 6601, the service providing system transmits, to the mobile user terminal, a ticket setup message 6602 that includes an examination program module for the designated electronic ticket.

[0562] Upon receiving the ticket setup message 6602, the mobile user terminal displays, on the touch panel LCD, a message indicating that the ticket setup processing has been completed (setup completion display 6603).

[0563] The ticket examination processing is shown in Fig. 67.

[0564] First, the user sets the mobile user terminal to the ticket mode and employs the function switch (F1 or F2) to display a ticket that is to be examined. The user depresses the execution switch 311, while directing the infrared communication port 300 toward the infrared communication module of the gate terminal (ticket presentation operation 6700). Then, through infrared communication, the mobile user terminal transmits, to the gate terminal, a ticket presentation message 6701 for presenting the contents of the ticket to the gate terminal.

[0565] Upon receiving the ticket presentation message 6701, the gate terminal examines the ticket type and transmits to the mobile user terminal, via infrared communication, a ticket examination message 6702 that includes a command for changing the state of the electronic ticket to the examined state.

[0566] Upon receiving the ticket examination message 6702, the mobile user terminal changes the state of the electronic ticket to the examined state, and transmits a ticket examination response 6703, which is a message indicating the changed state of the electronic ticket, to the gate terminal via the infrared communication.

[0567] Upon receiving the ticket examination response 6703, the gate terminal examines the contents of the ticket examination response 6703, and transmits an examination certificate 6704, which is a message indicating the electronic ticket has been examined, to the mobile user terminal via infrared communication. The results of the examination are displayed on the touch panel LCD (display examination results: 6705).

[0568] Upon receiving the examination certificate 6704, the mobile user terminal displays the examined ticket on the LCD ("examined" is displayed as the state of the ticket) (display the examined ticket: 6706).

[0569] Then, the operator (merchant) of the gate terminal permits the entrance of the user in accordance with the examination results that are displayed on the touch panel LCD (entrance permission 6707). When the gate opening/closing device is connected to the gate terminal. the gate is automatically opened (entrance permission 6707).

[0570] The ticket reference processing is shown in Fig. 71.

[0571] The ticket reference process is not performed in accordance with a special processing sequence, but is performed during the data updating processing during which the service providing system updates the data in the gate terminal.

[0572] When a time that has been set in advance is reached, the gate terminal automatically initiates the data updating process, and transmits, to the service providing system, a data update request 5702, which is a message requesting that the data updating process be performed.

[0573] The service providing system thereafter transmits, to the gate terminal, a data update response 5703, which is a message transmitted as a reply to the data update request 5702 that was received.

[0574] The data update response 5703 includes information indicating the range of the data that is to be uploaded (update option code 8809: Fig. 88B). Upon receiving the data update response 5703, the gate terminal generates and transmits, to the service providing system, upload data 5704, which is a message in which is included the data that is to be uploaded to the service providing system. At this time, the upload data 5704 includes information for a new electronic ticket that is being examined by the gate terminal.

[0575] In the service providing system, the service server 900 compares the received upload data 5704 with the data in the merchant information server 903, and generates data for updating the gate terminal. At this time, the service server 900 also compares information for the electronic ticket that is being examined by the gate terminal with the management information that is stored in the service director information server 901 for the registered electronic ticket, and examines the electronic ticket to determine whether it is valid. Then, the service server 900 transmits, to the gate terminal, an update data message 5705 that includes the data for updating the gate terminal. The update data for the gate terminal includes as

information ticket reference results that indicate what results were obtained when the electronic ticket was examined to determine whether it was valid.

[0576] The gate terminal develops the update data that is included in the received update data message 5705, and updates the internal data. At this time, the ticket reference results are also stored on the hard disk at of the gate terminal. In accordance with the contract agreed to by the merchant and the service providing system, the ticket reference results may be transmitted to the merchant by electronic mail or by regular mail, instead of being included in the update data for the gate terminal.

[0577] If the firm represented by the merchant differs from that represented by the ticket issuer, and a payment for the merchant who handles the ticket is made by the ticket issuer, or if the usage of the ticket is periodically reported to the ticket issuer in accordance with the terms of a contract, in accordance with the results that are obtained by the ticket reference process, the service providing system, for example, weekly generates a usage condition notification 7100, which is a message notifying the ticket issuer of the ticket usage condition, and transmits it to the ticket issuing system 107.

[0578] In Fig. 74 is shown the ticket transfer processing.

[0579] In Fig. 74 is shown a case where user A transfers an electronic ticket to user B. The basic processing is the same whether infrared communication or digital wireless communication is employed by the users A and B.

[0580] First, an explanation will be given when infrared communication is employed between the users A and B.

[0581] The ticket transfer process is initiated when the users A and B orally agree to the transfer of an electronic ticket.

[0582] First, user A sets the mobile user terminal to the ticket mode, and employs the function switch (F1 or F2) to display on the LCD a ticket that is to be transferred. User A depresses the function switch (F3) to display the operating menu for the electronic ticket, and selects "ticket transfer." Thereafter, the user A depresses the execution switch while directing the infrared communication port toward the infrared communication port of the mobile user terminal of user B (ticket transfer operation 7400). Then, via infrared communication, the mobile user terminal belonging to user A transmits, to the mobile user terminal belonging to user B, a ticket transfer offer 7401, which is a message offering to transfer an electronic ticket.

[0583] Upon receiving the ticket transfer offer 7401, the mobile user terminal belonging to user B examines the contents of the ticket transfer offer 7401, and displays on the LCD the contents of the electronic ticket that is to be transferred (display transfer offer: 7402).

[0584] User B confirms the contents displayed on the LCD, and depresses the execution switch, while directing the infrared communication port toward the infrared communication port of the mobile user terminal belonging to user A (transfer offer acceptance operation 7403). Then, via infrared communication, the mobile user terminal belonging to user B transmits, to the mobile user terminal belonging to user A, a ticket transfer offer response 7404, which is a message transmitted in response to the ticket transfer offer 7401.

[0585] The mobile user terminal of user A displays on the LCD the contents of the ticket transfer offer response 7404 (display the transfer offer response: 7405) that has been received. In addition, via infrared communication, the mobile user terminal of user A transmits to the mobile user terminal of user B a ticket transfer certificate 7406, which is a message corresponding to a certificate for the transfer of the electronic ticket to user B.

[0586] The mobile user terminal of user B examines the ticket transfer certificate 7406 that has been received, and via infrared communication transmits a ticket receipt 7407, which is a message stating that the electronic ticket has been transferred, to the mobile user terminal of user A.

[0587] Upon receiving the ticket receipt 7407, the mobile user terminal of user A displays on the LCD a transfer completion message (display transfer completion: 7408). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0588] After transmitting the ticket receipt 7407, the mobile user terminal of user B displays on the LCD the ticket transfer certificate 7406 that has been received. The mobile user terminal also displays a dialogue message to ask the user whether the transfer process with the service server (the process for downloading a transferred electronic ticket from the service providing system) should be performed immediately (display the transfer certificate: 7409).

[0589] The dialogue message includes two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process being performed with the service providing system is canceled. During the process (data updating process) wherein the service providing system updates the data in the mobile user terminal of user B, the electronic ticket that has been transferred is set up as a part of the update data for the mobile user terminal of user B.

[0590] When user B selects "transfer request" (transfer request operation 7410), the mobile user terminal employs the ticket transfer certificate 7406 to generate a ticket transfer request 7411, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7411 to the service providing system via digital wireless telephone communication.

[0591] The service providing system examines the contents of the ticket transfer request 7411 that has been received, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a ticket transfer message 7412 that includes the electronic ticket that was transferred by user A.

[0592] Upon receiving the ticket transfer message 7412, the mobile user terminal of user B displays the electronic ticket on the LCD (display the electronic ticket: 7413). The ticket transfer processing is thereafter terminated.

[0593] Next, an explanation will be given for digital wireless telephone communication between users A and B.

[0594] For this type of communication, the ticket transfer process is also initiated when users A and B orally agree on the transfer of an electronic ticket. At this time, users A and B are using digital wireless telephones to communicate with each other.

[0595] First, user A sets the mobile user terminal to the ticket mode and employs the function switch (F1 or F2) to display on the LCD a ticket to be transferred. User A then depresses the function switch (F3) to display the operating menu for the electronic ticket. The user selects "ticket transfer" and depresses the execution switch (ticket transfer operation 7400). Then, via digital wireless telephone communication, the mobile user terminal of user A transmits, to the mobile user terminal of user B, a ticket transfer offer 7401, which is a message offering to transfer an electronic ticket.

[0596] Upon receiving the ticket transfer offer 7401, the mobile user terminal of user B examines the contents of the ticket transfer offer 7401, and displays on the LCD the contents of the electronic ticket that is to be transferred (display transfer offer: 7402).

[0597] The user B confirms the contents displayed on the LCD, and depresses the execution switch (transfer offer acceptance operation 7403). Then, through digital wireless telephone communication, the mobile user terminal of user B transmits, to the mobile user terminal of user A, a ticket transfer offer response 7404, which is a response message for the ticket transfer offer 7401.

[0598] The mobile user terminal of user A displays on the LCD the contents of the received ticket transfer offer response 7404 (display the transfer offer response: 7405). Thereafter, via digital wireless telephone communication, the mobile user terminal transmits to the mobile user terminal of user B a ticket transfer certificate 7406, which is a message corresponding to a certificate for the transfer of the electronic ticket to user B.

[0599] The mobile user terminal of user B examines the received ticket transfer certificate 7406 and via digital wireless telephone communication transmits a ticket receipt 7407, which is a message stating that the electronic ticket has been transferred to user B, to the mobile user terminal of user A.

[0600] Upon receiving the ticket receipt 7407, the mobile user terminal of user A displays a transfer completion message on the LCD (display transfer completion: 7408). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0601] After transmitting the ticket receipt 7407, the mobile user terminal of user B displays on the LCD the received ticket transfer certificate 7406. Also, the mobile user terminal displays a dialogue message asking the user whether the transfer process with the service server (the process for downloading a transferred electronic ticket from the service providing system) should be performed immediately (display the transfer certificate: 7409).

[0602] Included in the dialogue message are two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process that is being conducted with the service providing system is canceled. During the process (data updating process) whereby the service providing system updates the data in the mobile user terminal of user B, the electronic ticket that has been transferred is set in the mobile user terminal of user B as a part of the update data.

[0603] When the user B selects "transfer request" (transfer request operation 7410), the mobile user terminal disconnects the communication line leading from user A and connects the digital wireless telephone communication line with the service providing system. Then, the mobile user terminal employs the ticket transfer certificate 7406 to generate a ticket transfer request 7411, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7411 to the service providing system via digital wireless telephone communication.

[0604] The service providing system examines the contents of the received ticket transfer request 7411, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a ticket transfer message 7412 that includes the electronic ticket that is being transferred by user A.

[0605] Upon receiving the ticket transfer message 7412, the mobile user terminal of user B displays the electronic ticket on the LCD (display the electronic ticket: 7413). The ticket transfer processing is thereafter terminated.

[0606] In Fig. 77 is shown the electronic ticket installation processing.

[0607] First, the user sets the mobile user terminal to the ticket mode and employs the function switch (F4) to display the operating menu for the ticket mode. The user then selects "install" and displays the installation screen on the LCD. Thereafter, the user employs the number key switches to enter the installation card number and the installation number that are printed on the electronic ticket installation card, and depresses the execution switch 311 (installation operation 7700). The mobile user terminal then transmits to the service providing system 110 an installation request 7701, which is a message requesting the installation of an electronic ticket.

[0608] The service providing system 110 specifies an installation card issuer by referring to the installation card number that is included in the received electronic ticket installation request 7701, and transmits to the ticket issuing system of that issuer a ticket installation request 7702, which is a message requesting that a ticket be issued.

[0609] In the ticket issuing system, the ticket issuing server 1100 compares the installation card number and the installation number, which are included in the ticket installation request 7702 that has been received, with the management information that is stored in the ticket issuing information server 1102 for the electronic ticket installation cards that have been issued. In addition, the ticket issuing server 1100 updates the data in the customer information server 1101, in the ticket issuing information server 1102, and in the ticket information server 1103. The ticket issuing server 1100 then generates the data for the requested ticket, and transmits to the service providing system an electronic ticket installation commission 7703, which is a message requesting the installation of an electronic ticket that corresponds to the ticket that has been requested.

[0610] Upon receiving the electronic ticket installation commission 7703, the service providing system generates an electronic ticket, and to install the electronic ticket in the mobile user terminal, transmits to the mobile user terminal an electronic ticket installation message 7704.

[0611] The mobile user terminal installs the electronic ticket that is included in the received electronic ticket installation message 7704, and displays on the LCD the installed electronic ticket (display the electronic ticket: 7705).

[0612] The ticket modification processing will now be described.

[0613] In the ticket modification process, the ticket issuer changes the contents of a ticket that has been issued. In accordance with that change, a program employed by the gate terminal for the examination of electronic tickets (ticket examination program) may be updated or an electronic ticket stored in the mobile user terminal may be changed, or both the program and the ticket may be changed.

[0614] First, an explanation will be given for a case wherein the ticket examination program of the gate terminal is updated.

[0615] In Fig. 80 is shown the ticket modification processing for the gate terminal. First, the ticket issuing system transmits to the service providing system a modification request 8000, which is a message requesting that the contents of a ticket that was issued be changed.

[0616] Upon receiving the modification request 8000, the service providing system performs the ticket modification processing for the gate terminal when the ticket examination program that is stored in the gate terminal has to be changed.

[0617] The ticket modification processing for the gate terminal is not performed in accordance with a special operating sequence, but by using a forcible data updating process during which the data held by the gate terminal is forcibly updated by the service providing system.

[0618] For the forcible data updating process, first, the service providing system transmits to the gate terminal a data update instruction 5706, which is a message instructing the updating of the data.

[0619] The data update instruction 5706 includes information describing the range of the data to be uploaded (update option code 8843: Fig. 88F). Upon receiving the data update instruction 5706, the gate terminal generates and transmits to the service providing system upload data 5707, which is a message in which is included data that is to be uploaded to the service providing system.

[0620] In the service providing system, the service server 900 compares the upload data 5707 that is received with the data in the merchant information server 903, and generates data for updating the gate terminal. At this time, the ticket examination program that has been changed is installed as data for the updating of the gate terminal. The service server 900 generates and transmits to the gate terminal an update data message 5708 that includes the data for updating the gate terminal.

[0621] The gate terminal develops the update data that is included in the update data message 5708 that has been received and updates the internal data. At this time, the ticket examination program is also updated.

[0622] An explanation will now be given for a case in which an electronic ticket held by the mobile user terminal is changed. In Fig. 81 is shown the ticket modification processing for the mobile user terminal. First, the ticket issuing system transmits to the service providing system a modification request 8100, which is a message requesting the changing of the contents of a ticket that has been issued. Upon receiving the modification request 8100, the service providing system performs the ticket modification process for the mobile user terminal of a user who owns an electronic ticket that must be altered. Using the modification request 8100, the service providing system generates, and transmits to the mobile user terminal, a modification notification 8101, which is a message employed to notify the user that the contents of the electronic ticket have been changed.

[0623] Upon receiving the modification notification 8101, the mobile user terminal outputs an audible signal to alert the user, and displays on the LCD a message featuring the altered contents of the electronic ticket and a message permitting the user to perform a complementary operation (display modification notification: 8102). When the date is changed, for example, a message describing the date change and a message permitting the user to select a complementary operation for the modification, "accept," "refuse" or "refund," are displayed.

[0624] Based on the messages displayed on the LCD, the user selects a complementary operation using the number key switches (reaction selection operation 8103). Then, the mobile user terminal generates a reaction selection message 8104, which conveys the reaction of the user to the modification notification 8101, and transmits it to the service providing system. When the user selects "refuse" or "refund," the

mobile user terminal changes the state of the electronic ticket to the disabled state.

[0625] When the reaction selection message 8104 is received, and when "accept" is selected as the user's reaction to the modification notification 8101, the service providing system transmits to the mobile user terminal a modification instruction 8105, which is a message in which is included a new electronic ticket. When "refund" is selected, the service providing system initiates the ticket refund processing. When "refuse" is selected, the service providing system changes, to the disabled state, the state of the electronic ticket belonging to the pertinent user that is stored in the user information server 902, and terminates the ticket modification processing.

[0626] Upon receiving the modification instruction 8105, the mobile user terminal updates the electronic ticket that must be changed to an electronic ticket that is included in the modification instruction 8105, and displays the updated electronic ticket on the LCD (ticket display 8106).

[0627] The ticket refund processing is shown in Fig. 82.

[0628] In the ticket refund processing, the procedures in the ticket modification processing (Fig. 81) are also performed until the mobile user terminal transmits a reaction selection message 8204 (8104) to the service providing system.

[0629] Upon receiving the reaction selection message 8204, the service providing system notes that the user's reaction to the modification notification 8101 is "refund," and transmits to the ticket issuing system a refund request 8205, which is a message requesting that the ticket issuer refund the amount charged for the ticket.

[0630] Upon the refund request 8205 being received by the ticket issuing system, the ticket issuing server 1100 updates the data in the customer information server 1101, the ticket issuing information server 1102 and the ticket information server 1103, and cancels the ticket that was issued. Then, the ticket issuing server 1100 generates a refund commission 8206, which is a message requesting that the service providing system refund the amount charged for the electronic ticket, and transmits the refund commission 8206 to the service providing system. Upon receiving the refund commission 8206, the service providing system transmits to the transaction processing system 106 a refund clearing request 8207, which is a message requesting that the ticket refund clearing process be performed.

[0631] Upon the refund clearing request 8207 being received at the transaction processing system, the transaction server 1000 updates the data in the subscriber information server 1001, the member store information server 1002 and the transaction information server 1103, and performs the refund clearing process. The transaction server 1000 then transmits to the service providing system a refund clearing completion notification 8208, which is a message stating that the refund clearing process has been completed.

[0632] In accordance with the received refund clearing completion notification 8208, the service providing system generates a refund clearing completion notification 8209, which is a message stating that the refund clearing process has been completed, and transmits it to the ticket issuing system. Upon receiving the refund clearing completion notification 8209, the ticket issuing system generates and transmits to the service providing system a refund receipt 8210 that corresponds to a receipt for the refund of the amount charged for the ticket.

[0633] The service providing system employs the refund receipt 8210 to generate a refund receipt 8211, which is a receipt message for a user, and transmits it to the mobile user terminal.

[0634] The mobile user terminal displays on the LCD 303 the received refund receipt 8211 (display the refund receipt: 8212). The ticket refund processing is thereafter terminated.

[0635] A detailed explanation will be given later for the contents of the messages that are exchanged by the devices during the above electronic ticket service processing.

[0636] The electronic payment card service will now be described.

[0637] The electronic payment card service mainly includes seven types of processes: an electronic payment card purchase process, an electronic payment card registration process, an electronic payment

card setup process, an electronic payment card settlement process, an electronic payment card reference process, an electronic payment card transfer process, and an electronic payment card installation process.

[0638] The payment card purchase process is a process whereby the user purchases an electronic payment card from a payment card issuer. The payment card registration process is a process whereby, in the service providing system, the user registers for his or her own use a purchased payment card or one received as a gift. The payment card setup process is a process whereby the service provider determines the process to be employed for the electronic payment card at the merchant terminal 102 or 103 or at the automatic vending machine in accordance with a contract entered into with a merchant. The payment card settlement process is a process whereby the user employs the electronic payment card for a settlement process with the merchant terminal 102 or 103, or the automatic vending machine 104. The payment card reference process is a process whereby the merchant terminal 102 or 103 or the automatic vending machine 104 asks the service providing system whether the electronic payment card that is employed is valid. The payment card transfer process is a process for transferring an electronic payment card. And the electronic payment card installation process is a process for installing an electronic payment card in the mobile user terminal 100 using an electronic payment card installation card.

[0639] In Fig. 61 is shown the payment card purchase processing.

[0640] First, the user sets the mobile user terminal 100 to the payment card mode, and uses the function switch (F4) to display the operating menu for the payment card mode. Thereafter, the user selects "payment card purchase," and the payment card order screen is displayed on the LCD. Then, by using the function switch 307 and the number key switches 308, the user selects a payment card issuer, enters the order code for a desired payment card and a desired number of payment cards, designates a credit card to be used for payment and the number of payments, and enters the code number. The user then depresses the execution switch 311 (payment card order operation 6100), and the mobile user terminal transmits, to the service providing system, a payment card order 6101, which is a message for applying for an electronic payment card. Upon receiving the payment card order 6101, the service providing system transmits, to the payment card issuing system 108, a payment card order 6102, which is a message used to apply for a payment card.

[0641] Upon the payment card order 6102 being received at the payment card issuing system, the payment card issuing server 1200 updates the data in the customer information server 1201, the payment card issuing information server 1202 and the payment card information server 1203. The payment card issuing server 1200 generates payment card data for the ordered payment card, and transmits, to the service providing system, an electronic payment card issuing commission 6103, which is a message requesting that a corresponding electronic payment card be issued and that the settlement process be performed for the price of the payment card.

[0642] Upon receiving the electronic payment card issuing commission 6103, the service providing system transmits, to the transaction processing system 106, a clearing request 6104, which is a message requesting that the price of the payment card be cleared.

[0643] Upon the clearing request 6104 being received at the transaction processing system, the transaction server 1000 updates data in the subscriber information server 1001, in the member store information server 1002 and in the transaction information server 1003, performs the clearing of the credit card, and transmits to the service providing system a clearing completion notification 6105, which is a message stating that the clearing process has been completed.

[0644] Upon receiving the clearing completion notification 6105, the service providing system generates a clearing completion notification 6106, which is a message stating that the clearing process has been completed, and transmits it to the payment card issuing system. In addition, the service providing system generates an electronic payment card to be issued to the user.

[0645] Upon receiving the clearing completion notification 6106, the payment card issuing system generates, and transmits to the service providing system, a receipt 6107, which is a message corresponding to the receipt for the sale of the payment card.

[0646] Based on the received receipt 6107, the service providing system generates a receipt 6109, which is a receipt message for the user, and transmits it to the mobile user terminal, together with an electronic payment issuance message 6108 that includes the electronic payment card that has been generated.

[0647] Upon receiving the electronic payment card issuance message 6108 and the receipt 6109, the mobile user terminal displays the purchased electronic payment card on the LCD (display the electronic payment card: 6110). At this time, a dialogue message is also displayed on the LCD for registering the electronic payment card that has been purchased. Then, when the user selects "register," the mobile user terminal initiates the payment card registration process.

[0648] The payment card registration processing is shown in Fig. 65B.

[0649] The payment card registration process is begun when the dialogue message for registering an electronic payment card for use is displayed on the LCD. To display the dialogue message for the use registration, the execution switch 311 is depressed immediately after the electronic payment card is purchased, or while an electronic payment card that has not yet been registered is displayed ("unregistered" is displayed as the state of the payment card).

[0650] The dialogue message for registration has two operating menus: "register" and "cancel." When the user selects "cancel," the payment card registration process is canceled. When the user selects "register" (registration operation of an electronic payment card: 6504), the mobile user terminal transmits, to the service providing system, a payment card registration request 6505, which is a message requesting the registration of an electronic payment card. In the service providing system, the service server 900 compares the contents of the received payment card registration request 6505 with the user information in the user information server 902. The service server 900 updates the management information that is stored in the service director information server 901 for an electronic payment card that has been registered. The service server 900 registers the electronic payment card, and transmits, to the mobile user terminal, a payment card certificate issuance message 6506, which includes a certificate for the registered electronic payment card.

[0651] Upon receiving the payment card certificate 6506, the mobile user terminal displays the registered electronic payment card on the LCD ("registered" is displayed as the state of the payment card) (display a registered payment card: 6507).

[0652] The payment card setup processing will now be described.

[0653] The payment card setup process is a process for, in accordance with a contract entered into by the service provider and the merchant, setting and updating an electronic payment card that is to be processed by the merchant terminal 102 or 103 or the automatic vending machine 104.

[0654] The payment card setup process is not performed according to a special processing sequence, but is performed during the data updating processing (Fig. 57B) when the service providing system updates the data in the merchant terminal 102 or 103 and the automatic vending machine 104.

[0655] When a time that has been set in advance is reached, the merchant terminal 102 or 103, or the automatic vending machine 104 automatically initiates the data updating process, and transmits, to the service providing system, a data update request 5702, which is a message requesting the performance of the data updating process.

[0656] The service providing system transmits, to the merchant terminal 102 or 103 or the automatic vending machine 104, a data update response 5703, which is a message dispatched in response to the receipt of the data update request 5702.

[0657] Upon receiving the data update response 5703, the merchant terminal 102 or 103 or the automatic vending machine 104 generates and transmits, to the service providing system, upload data 5704, which is a message in which is included data to be uploaded to the service providing system.

[0658] The service providing system compares the received upload data 5704 with the data in the merchant information server 903 and generates update data. At this time, an electronic payment card that is to be processed is updated, and information for the update is included in the update data.

[0659] Then, the service providing system transmits, to the merchant terminal 102 or 103 or the automatic vending machine 104, an update data message 5705 that includes the update data that has been generated. The merchant terminal 102 or 103 or the automatic vending machine 104 develops the update

data that is included in the received update data message 5705, and updates the internal data. At this time, the electronic payment card that is processed by the merchant 102 or 103 or the automatic vending machine 104 is also updated.

[0660] In Fig. 68 is shown the payment card settlement processing performed by the mobile user terminal 100 and the merchant terminal 102 or 103.

[0661] First, the user notifies the merchant that an electronic payment card will be employed for the payment (instruct settlement to be made with an electronic payment card: 6800).

[0662] The merchant thereafter depresses the payment card settlement switch 512 (the function switch F2 for the merchant terminal 102) (depress the payment card settlement switch: 6801), and permits the user to start the payment operation (instruct the start of the payment operation: 6803). At this time, the total charge and a message indicating that the merchant terminal is waiting for the user to initiate the payment operation are displayed on the LCD of the merchant terminal 102 or 103 (display "waiting for payment operation": 6802).

[0663] The user sets the mobile user terminal to the payment card mode, employs the function switch (F1 or F2) to display a payment card to be used for the payment, and enters the payment amount using the number key switches. Then, while directing the infrared communication port 300 toward the infrared communication module of the merchant terminal (the infrared communication port for the merchant terminal 103), the user depresses the execution switch 311, (payment operation 6804). The amount entered by the user may be equal to or greater than the charge.

[0664] The mobile user terminal generates a payment offer 6805 that includes the payment amount entered by the user and information regarding the electronic payment card designated by the user, and that is a message offering to pay the merchant an amount equal to the price. The payment offer 6805 is transmitted to the merchant terminal via infrared communication.

[0665] Upon receiving the payment offer 6805, the merchant terminal examines the type of payment card, the payment amount and the remaining amount, and via infrared communication, transmits to the mobile user terminal a payment offer response 6806, which is a response message for the payment offer 6805. The payment offer response 6806 includes information regarding the amount charged.

[0666] Upon receiving the payment offer response 6806, the mobile user terminal confirms that the amount charged is equal to or lower than the payment amount entered by the user. The user subtracts the amount charged from the total remaining amount held by the electronic payment card, and generates a micro-check 6807, which is a message corresponding to a check on which the amount charged is given as the face value. The micro-check 6807 is transmitted to the merchant terminal via infrared communication.

[0667] The merchant terminal examines the contents of the received micro-check 6807 and generates a receipt 6808, which is a message corresponding to a message for the micro-check 6807 that has been paid. The merchant terminal transmits the receipt 6808 to the mobile user terminal via infrared communication, and displays, on the LCD, a message indicating that the payment card clearing process has been completed (display clearing completion: 6810).

[0668] A product is thereafter delivered by the merchant to the user (delivery of a product: 6811).

[0669] In Fig. 69 is shown the payment settlement processing performed by the mobile user terminal 100 and the automatic vending machine 104.

[0670] First, the user selects "purchase" from the operating menu that is displayed on the touch panel LCD of the automatic vending machine (purchase start operation 6900). The automatic vending machine then displays, on the touch panel LCD, a message permitting the user to select a product (display "waiting for product selection operation": 6901).

[0671] When the user depresses the product selection switches 704 for desired products (product selection operation 6902), the automatic vending machine counts the number of selected products, calculates the total charge, and displays, on the touch panel LCD, the names, the volumes and the total amount charged for the selected products, and a button for starting the payment operation (display "waiting for the payment start operation": 6903). Furthermore, when the user depresses the selection switch 704 for other desired

products (product selection operation 6902), similarly, the automatic vending machine counts the number of selected products, calculates the total charge, and displays, on the touch panel LCD, the names, the volumes and the total amount charged for the selected products, and the button for starting the payment operation (display "waiting for the payment start operation": 6903).

[0672] When the user presses the payment operation start button (payment start operation 6904), the automatic vending machine displays, on the LCD, a message permitting the user to start the payment operation using the electronic payment card (display "waiting for the payment operation": 6905).

[0673] The user sets the mobile user terminal to the payment card mode, employs the function switch (F1 or F2) to display a payment card to be used for the payment, and enters the amount of the payment using the number key switches (the amount to be paid entered by the user may be equal to or greater than the total value of the products). Then, while directing the infrared communication port 300 toward the infrared communication port of the automatic vending machine (payment operation 6906), the user depresses the execution switch 311. The mobile user terminal generates a payment offer 6907 that includes the amount of the payment entered by the user and the information for the electronic payment card (card type or the remaining total amount) and that is a message to the automatic vending machine (merchant) offering to pay the amount represented by the price. The payment offer 6907 is then transmitted to the automatic vending machine via infrared communication.

[0674] Upon receiving the payment offer 6907, the automatic vending machine examines the type of payment card and the remaining amount, and via infrared communication, transmits to the mobile user terminal a payment offer response 6908, which is a response message for the payment offer 6907. The payment offer response 6908 includes information expressing the amount charged (the total value of the products).

[0675] Upon receiving the payment offer response 6908, the mobile user terminal confirms that the charge amount is equal to or lower than the amount of the payment entered by the user. The user subtracts the charge amount from the total remaining amount held by the electronic payment card, and generates a micro-check 6909, which is a message corresponding to a check on which the amount charged is given as the face value. The micro-check 6909 is thereafter transmitted to the automatic vending machine via infrared communication. The automatic vending machine examines the contents of the received micro-check 6909, and generates a receipt 6910, which is a message corresponding to the message for the micro-check 6909 that has been paid. The automatic vending machine transmits the receipt 6910 to the mobile user terminal via infrared communication and discharges products through the discharge port 703.

[0676] The mobile user terminal displays the contents of the receipt 6910 on the LCD (display the receipt: 6911), and thereafter, the payment card settlement processing at the mobile user terminal is terminated.

[0677] The payment card reference processing is shown in Fig. 72.

[0678] The payment card reference process is not performed in accordance with a special processing sequence, but is performed during the data updating processing, when the service providing system updates the data in the merchant terminal 102 or 103 or in the automatic vending machine 104.

[0679] When a time that has been set in advance is reached, the merchant terminal 102 or 103 or the automatic vending machine 104 automatically initiates the data updating process, and transmits, to the service providing system, a data update request 5702, which is a message requesting that the data updating process be performed.

[0680] The service providing system thereafter transmits, to the merchant terminal 102 or 103 or the automatic vending machine 104, a data update response 5703, which is a message transmitted as a reply to the data update request 5702 that was received.

[0681] The data update response 5703 includes information indicating the range of the data that is to be uploaded (update option code 8809: Fig. 88B). Upon receiving the data update response 5703, the merchant terminal 102 or 103 or the automatic vending machine 104 generates and transmits, to the service providing system, upload data 5704, which is a message in which is included the data that is to be uploaded to the service providing system. At this time, the upload data 5704 includes information for a new micro-check that is processed during the payment card clearing process.

[0682] In the service providing system, the service server 900 compares the received upload data 5704 with the data in the merchant information server 903, and generates update data. At this time, the service server 900 also compares information for the micro-check with the management information that is stored in the service director information server 901 for the registered electronic payment card, and examines the micro-check to determine whether it is valid. Then, the service server 900 transmits, to the merchant terminal 102 or 103 or the automatic vending machine 104, an update data message 5705 that includes the data for updating the merchant terminal 102 or 103 or the automatic vending machine 104. The update data for the merchant terminal 102 or 103 or the automatic vending machine 104 includes as information payment card reference results that indicate what results were obtained when the micro-check was examined to determine whether it was valid.

[0683] The merchant terminal 102 or 103 or the automatic vending machine 104 develops the update data that is included in the received update data message 5705, and updates the internal data. At this time, the payment card reference results are also stored as internal data for the merchant terminal 102 or 103. For the automatic vending machine 104, the payment card reference results are transmitted to a merchant by electronic mail or by regular mail.

[0684] Also for the merchant terminal 102 or 103, in accordance with the contract agreed to by the merchant and the service providing system, the payment card reference results may be transmitted to the merchant by electronic mail or by regular mail, instead of being included in the update data for the merchant terminal.

[0685] If the firm represented by the merchant differs from that represented by the payment card issuer, and a payment for the merchant who handles the micro-check is made by the payment card issuer, or if the usage of the payment card is periodically reported to the payment card issuer in accordance with the terms of a contract, in accordance with the results that are obtained by the payment card reference process, the service providing system, for example, weekly generates a usage condition notification 7200, which is a message notifying the payment card issuer of the payment card usage condition, and transmits it to the payment card issuing system 108.

[0686] In Fig. 75 is shown the payment card transfer processing.

[0687] In Fig. 75 is shown a case where user A transfers an electronic payment card to user B. The basic processing is the same whether infrared communication or digital wireless communication is employed by the users A and B.

[0688] First, an explanation will be given when infrared communication is employed between the users A and B.

[0689] The payment card transfer process is initiated when the users A and B orally agree to the transfer of an electronic payment card.

[0690] First, user A sets the mobile user terminal to the payment card mode, and employs the function switch (F1 or F2) to display on the LCD a payment card that is to be transferred. User A depresses the function switch (F3) to display the operating menu for the electronic payment card, and selects "payment card transfer." Thereafter, the user A depresses the execution switch while directing the infrared communication port toward the infrared communication port of the mobile user terminal of user B (payment card transfer operation 7500). Then, via infrared communication, the mobile user terminal belonging to user A transmits, to the mobile user terminal belonging to user B, a payment card transfer offer 7501, which is a message offering to transfer an electronic payment card.

[0691] Upon receiving the payment card transfer offer 7501, the mobile user terminal belonging to user B examines the contents of the payment card transfer offer 7501, and displays on the LCD the contents of the electronic payment card that is to be transferred (display transfer offer: 7502).

[0692] User B confirms the contents displayed on the LCD, and depresses the execution switch, while directing the infrared communication port toward the infrared communication port of the mobile user terminal belonging to user A (transfer offer acceptance operation 7503). Then, via infrared communication, the mobile user terminal belonging to user B transmits, to the mobile user terminal belonging to user A, a payment card transfer offer response 7504, which is a message transmitted in response to the payment card transfer offer 7501. The mobile user terminal of user A displays on the LCD the contents of the

payment card transfer offer response 7504 (display the transfer offer response: 7505) that has been received. In addition, via infrared communication, the mobile user terminal of user A transmits to the mobile user terminal of user B a payment card transfer certificate 7506, which is a message corresponding to a certificate for the transfer of the electronic payment card to user B.

[0693] The mobile user terminal of user B examines the payment card transfer certificate 7506 that has been received, and via infrared communication transmits a payment card receipt 7507, which is a message stating that the electronic payment card has been transferred, to the mobile user terminal of user A.

[0694] Upon receiving the payment card receipt 7507, the mobile user terminal of user A displays on the LCD a transfer completion message (display transfer completion: 7508). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0695] After transmitting the payment card receipt 7507, the mobile user terminal of user B displays on the LCD the payment card transfer certificate 7506 that has been received. The mobile user terminal also displays a dialogue message to ask the user whether the transfer process with the service server (the process for downloading a transferred electronic payment card from the service providing system) should be performed immediately (display the transfer certificate: 7509).

[0696] The dialogue message includes two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process being performed with the service providing system is canceled. During the process (data updating process) wherein the service providing system updates the data in the mobile user terminal of user B, the electronic payment card that has been transferred is set up as a part of the update data for the mobile user terminal of user B.

[0697] When user B selects "transfer request" (transfer request operation 7510), the mobile user terminal employs the payment card transfer certificate 7506 to generate a payment card transfer request 7511, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7511 to the service providing system 110 via digital wireless telephone communication.

[0698] The service providing system examines the contents of the payment card transfer request 7511 that has been received, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a payment card transfer message 7512 that includes the electronic payment card that was transferred by user A.

[0699] Upon receiving the payment card transfer message 7512, the mobile user terminal of user B displays the electronic payment card on the LCD (display the electronic payment card: 7513). The payment card transfer processing is thereafter terminated.

[0700] Next, an explanation will be given for digital wireless telephone communication between users A and B.

[0701] For this type of communication, the payment card transfer process is also initiated when users A and B orally agree on the transfer of an electronic payment card. At this time, users A and B are using digital wireless telephones to communicate with each other.

[0702] First, user A sets the mobile user terminal to the payment card mode and employs the function switch (F1 or F2) to display on the LCD a payment card to be transferred. User A then depresses the function switch (F3) to display the operating menu for the electronic payment card. The user selects "payment card transfer" and depresses the execution switch (payment card transfer operation 7500). Then, via digital wireless telephone communication, the mobile user terminal of user A transmits, to the mobile user terminal of user B, a payment card transfer offer 7501, which is a message offering to transfer an electronic payment card.

[0703] Upon receiving the payment card transfer offer 7501, the mobile user terminal of user B examines the contents of the payment card transfer offer 7501, and displays on the LCD the contents of the electronic payment card that is to be transferred (display transfer offer: 7502).

[0704] The user B confirms the contents displayed on the LCD, and depresses the execution switch (transfer offer acceptance operation 7503). Then, through digital wireless telephone communication, the

mobile user terminal of user B transmits, to the mobile user terminal of user A, a payment card transfer offer response 7504, which is a response message for the payment card transfer offer 7501.

[0705] The mobile user terminal of user A displays on the LCD the contents of the received payment card transfer offer response 7504 (display the transfer offer response: 7505). Thereafter, via digital wireless telephone communication, the mobile user terminal transmits to the mobile user terminal of user B a payment card transfer certificate 7506, which is a message corresponding to a certificate for the transfer of the electronic payment card to user B.

[0706] The mobile user terminal of user B examines the received payment card transfer certificate 7506 and via digital wireless telephone communication transmits a payment card receipt 7507, which is a message stating that the electronic payment card has been transferred to user B, to the mobile user terminal of user A.

[0707] Upon receiving the payment card receipt 7507, the mobile user terminal of user A displays a transfer completion message on the LCD (display transfer completion: 7508). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0708] After transmitting the payment card receipt 7507, the mobile user terminal of user B displays on the LCD the received payment card transfer certificate 7506. Also, the mobile user terminal displays a dialogue message asking the user whether the transfer process with the service server (the process for downloading a transferred electronic payment card from the service providing system) should be performed immediately (display the transfer certificate: 7509).

[0709] Included in the dialogue message are two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process that is being conducted with the service providing system is canceled. During the process (data updating process) whereby the service providing system updates the data in the mobile user terminal of user B, the electronic payment card that has been transferred is set in the mobile user terminal of user B as a part of the update data.

[0710] When the user B selects "transfer request" (transfer request operation 7510), the mobile user terminal disconnects the communication line leading from user A and connects the digital wireless telephone communication line with the service providing system. Then, the mobile user terminal employs the payment card transfer certificate 7506 to generate a payment card transfer request 7511, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7511 to the service providing system via digital wireless telephone communication.

[0711] The service providing system examines the contents of the received payment card transfer request 7511, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a payment card transfer message 7512 that includes the electronic payment card that is being transferred by user A.

[0712] Upon receiving the payment card transfer message 7512, the mobile user terminal of user B displays the electronic payment card on the LCD (display the electronic payment card: 7513). The payment card transfer processing is thereafter terminated.

[0713] In Fig. 78 is shown the electronic payment card installation processing.

[0714] First, the user sets the mobile user terminal to the payment card mode and employs the function switch (F4) to display the operating menu for the payment card mode. The user then selects "install" and displays the installation screen on the LCD. Thereafter, the user employs the number key switches to enter the installation card number and the installation number that are printed on the electronic payment card installation card, and depresses the execution switch 311 (installation operation 7800). The mobile user terminal then transmits to the service providing system 110 an installation request 7801, which is a message requesting the installation of an electronic payment card.

[0715] The service providing system 110 specifies an installation card issuer by referring to the installation card number that is included in the received electronic payment card installation request 7801, and transmits to the payment card issuing system of that issuer a payment card installation request 7802, which is a message requesting that a payment card be issued.

[0716] In the payment card issuing system, the payment card issuing server 1200 compares the installation card number and the installation number, which are included in the payment card installation request 7802 that has been received, with the management information that is stored in the payment card issuing information server 1202 for the electronic payment card installation cards that have been issued. In addition, the payment card issuing server 1200 updates the data in the customer information server 1201, in the payment card issuing information server 1202, and in the payment card information server 1203. The payment card issuing server 1200 then generates the data for the requested payment card, and transmits to the service providing system an electronic payment card installation commission 7803, which is a message requesting the installation of an electronic payment card that corresponds to the payment card that has been requested.

[0717] Upon receiving the electronic payment card installation commission 7803, the service providing system generates an electronic payment card, and to install the electronic payment card in the mobile user terminal, transmits to the mobile user terminal an electronic payment card installation message 7804.

[0718] The mobile user terminal installs the electronic payment card that is included in the received electronic payment card installation message 7804, and displays on the LCD the installed electronic payment card (display the electronic payment card: 7805).

[0719] A detailed explanation will be given later for the contents of the messages that are exchanged by the devices during the above electronic payment card service processing.

[0720] The electronic telephone card service will now be described.

[0721] The electronic telephone card service mainly includes seven types of processes: an electronic telephone card purchase process, an electronic telephone card registration process, an electronic telephone card setup process, an electronic telephone card settlement process, an electronic telephone card reference process, an electronic telephone card transfer process, and an electronic telephone card installation process.

[0722] The telephone card purchase process is a process whereby the user purchases an electronic telephone card from a telephone card issuer. The telephone card registration process is a process whereby, in the service providing system, the user registers for his or her own use a purchased telephone card or one received as a gift. The telephone card setup process is a process whereby the service provider determines the process to be employed for the electronic telephone card at the electronic telephone card accounting machine 800 of the switching center 105 in accordance with a contract entered into with a communication service provider. The telephone card settlement process is a process whereby the user employs the electronic telephone card for communication. The telephone card reference process is a process whereby the electronic telephone card accounting machine 800 asks the service providing system whether the electronic telephone card that is employed is valid. The telephone card transfer process is a process for transferring an electronic telephone card. And the electronic telephone card installation process is a process for installing an electronic telephone card in the mobile user terminal 100 using an electronic telephone card installation card.

[0723] In Fig. 63 is shown the telephone card purchase processing.

[0724] First, the user sets the mobile user terminal 100 to the telephone card mode, and uses the function switch (F4) to display the operating menu for the telephone card mode. Thereafter, the user selects "telephone card purchase," and the telephone card order screen is displayed on the LCD. Then, by using the function switch 307 and the number key switches 308, the user selects a telephone card issuer, enters the order code for a desired telephone card and a desired number of telephone cards, designates a credit card to be used for payment and the number of payments, and enters the code number. The user then depresses the execution switch 311 (telephone card order operation 6300), and the mobile user terminal transmits, to the service providing system, a telephone card order 6301, which is a message for applying for an electronic telephone card. Upon receiving the telephone card order 6301, the service providing system transmits, to the telephone card issuing system 109, a telephone card order 6302, which is a message used to apply for a telephone card.

[0725] Upon the telephone card order 6302 being received at the telephone card issuing system, the telephone card issuing server 1300 updates the data in the customer information server 1301, the telephone card issuing information server 1302 and the telephone card information server 1303. The

telephone card issuing server 1300 generates telephone card data for the ordered telephone card, and transmits, to the service providing system, an electronic telephone card issuing commission 6303, which is a message requesting that a corresponding electronic telephone card be issued and that the settlement process be performed for the price of the telephone card.

[0726] Upon receiving the electronic telephone card issuing commission 6303, the service providing system transmits, to the transaction processing system 106, a clearing request 6304, which is a message requesting that the price of the telephone card be cleared.

[0727] Upon the clearing request 6304 being received at the transaction processing system, the transaction server 1000 updates data in the subscriber information server 1001, in the member store information server 1002 and in the transaction information server 1003, performs the clearing of the credit card, and transmits to the service providing system a clearing completion notification 6305, which is a message stating that the clearing process has been completed.

[0728] Upon receiving the clearing completion notification 6305, the service providing system generates a clearing completion notification 6306, which is a message stating that the clearing process has been completed, and transmits it to the telephone card issuing system. In addition, the service providing system generates an electronic telephone card to be issued to the user.

[0729] Upon receiving the clearing completion notification 6306, the telephone card issuing system generates, and transmits to the service providing system, a receipt 6307, which is a message corresponding to the receipt for the sale of the telephone card.

[0730] Based on the received receipt 6307, the service providing system generates a receipt 6309, which is a receipt message for the user, and transmits it to the mobile user terminal, together with an electronic telephone issuance message 6308 that includes the electronic telephone card that has been generated.

[0731] Upon receiving the electronic telephone card issuance message 6308 and the receipt 6309, the mobile user terminal displays the purchased electronic telephone card on the LCD (display the electronic telephone card: 6310). At this time, a dialogue message is also displayed on the LCD for registering the electronic telephone card that has been purchased. Then, when the user selects "register," the mobile user terminal initiates the telephone card registration process.

[0732] The telephone card registration processing is shown in Fig. 65C. The telephone card registration process is begun when the dialogue message for registering an electronic telephone card for use is displayed on the LCD. To display the dialogue message for the use registration, the execution switch 311 is depressed immediately after the electronic telephone card is purchased, or while an electronic telephone card that has not yet been registered is displayed ("unregistered" is displayed as the state of the telephone card).

[0733] The dialogue message for registration has two operating menus: "register" and "cancel." When the user selects "cancel," the telephone card registration process is canceled. When the user selects "register" (registration operation of an electronic telephone card: 6508), the mobile user terminal transmits, to the service providing system, a telephone card registration request 6509, which is a message requesting the registration of an electronic telephone card. In the service providing system, the service server 900 compares the contents of the received telephone card registration request 6509 with the user information in the user information server 902. The service server 900 updates the management information that is stored in the service director information server 901 for an electronic telephone card that has been registered. The service server 900 registers the electronic telephone card, and transmits, to the mobile user terminal, a telephone card certificate issuance message 6510, which includes a certificate for the registered electronic telephone card.

[0734] Upon receiving the telephone card certificate 6510, the mobile user terminal displays the registered electronic telephone card on the LCD ("registered" is displayed as the state of the telephone card) (display a registered telephone card: 6511).

[0735] The telephone card setup processing will now be described.

[0736] The telephone card setup process is a process for, in accordance with a contract entered into by the service provider and the communication service provider, setting and updating an electronic telephone card

that is to be processed by the electronic telephone card accounting machine 800 of the switching center 105.

[0737] The telephone card setup process is not performed according to a special processing sequence, but is performed during the data updating processing (Fig. 57B) when the service providing system updates the data in the electronic telephone card accounting machine 800 of the switching center 105.

*[0738] When a time that has been set in advance is reached, the electronic telephone card accounting machine 800 automatically initiates the data updating process, and transmits, to the service providing system, a data update request 5702, which is a message requesting the performance of the data updating process.

[0739] The service providing system transmits, to the electronic telephone card accounting machine 800, a data update response 5703, which is a message dispatched in response to the receipt of the data update request 5702.

[0740] Upon receiving the data update response 5703, the electronic telephone card accounting machine 800 generates and transmits, to the service providing system, upload data 5704, which is a message in which is included data to be uploaded to the service providing system.

[0741] The service providing system compares the received upload data 5704 with the data in the merchant information server 903 and generates update data. At this time, an electronic telephone card that is to be processed is updated, and information for the update is included in the update data.

[0742] Then, the service providing system transmits, to the electronic telephone card accounting machine 800, an update data message 5705 that includes the update data that has been generated. The electronic telephone card accounting machine 800 develops the update data that is included in the received update data message 5705, and updates the internal data. At this time, the electronic telephone card that is processed by the electronic telephone card accounting machine 800 is also updated.

[0743] In Fig. 70 is shown the telephone card settlement processing.

[0744] First, the user sets the mobile user terminal to the telephone card mode, employs the function switch (F1 or F2) to display a telephone card to be used for the payment of a communication charge, enters the telephone number using the number key switches 308, and depresses the speech switch 305 (display an electronic telephone card and make a call: 7000). The mobile user terminal transmits, to the switching center 105, a micro-check call request 7001, which is a message used to request communication, using the electronic telephone card, with a destination indicated by the telephone number that is entered by the user.

[0745] In the switching center, the electronic telephone card accounting machine 800 examines the contents of the micro-check call request 7001 that has been received, and transmits, to the mobile user terminal, a micro-check call response 7002, which is a message for charging a communication fee V (V > 0) for a specific communication time T (T > 0).

[0746] Upon receiving the micro-check call response 7002, the mobile user terminal subtracts the communication fee V from the total remaining amount held by the electronic telephone card, and generates and transmits, to the switching center, a telephone micro-check 7003, which is a message corresponding to a check on which the communication fee is entered as the face value. Further, the mobile user terminal displays, on the LCD, a message indicating that a call is in process (display "call in process": 7004).
At the switching center, first, the electronic telephone card accounting machine examines the contents of the telephone micro-check 7003 that has been received. Then, the switch 801 transmits, to the telephone terminal 115, a call reception request 7005, which is message for the calling of the telephone terminal 115 indicated by the telephone number entered by the user.

[0747] Upon receiving the call reception request 7005, the telephone terminal 115 outputs a call tone to notify the owner of the telephone terminal 115 (receiver) that a call has been received (display "call reception": 7006). When the receiver answers the phone (speech operation 7007), the telephone terminal 115 transmits, to the switch 801, a call reception response 7008, which a message stating that the call is permitted.

[0748] When the switch 801 receives the call reception response 7008, first, the electronic telephone card accounting machine generates and transmits, to the mobile user terminal, a receipt 7009, which is a message corresponding to a receipt for the telephone micro-check 7003 that has been issued. Then, the switch 801 establishes the connection between the mobile user terminal and the telephone terminal, so that the user can communicate with the caller. At this time, the display on the LCD of the mobile user terminal is changed to one related to the connected state (telephone number for the current communication, the elapsed time and the total remaining amount held by the electronic telephone card) (display "line is connected": 7010).

[0749] When the period of communication time exceeds T, instead of transmitting the telephone micro-check 7003 having the face value V, the electronic telephone card accounting machine transmits, to the mobile user terminal, a communication charge message 7011 for an electronic micro-check for an amount charged that has a face value that equals a communication fee 2V for a communication time 2T,

[0750] Upon receiving the communication charge 7011, the mobile user terminal further subtracts the communication fee V from the total remaining amount held by the electronic telephone card, and generates and transmits, to the switching center, a telephone micro-check 7012 for which the communication fee 2V is entered as the face value.

[0751] The electronic telephone card accounting machine examines the contents of the electronic telephone micro-check 7012 that is received, and generates and transmits, to the mobile user terminal, a receipt 7013, which is a message corresponding to a receipt for the electronic micro-check 7012.

[0752] Upon receiving the receipt 7013, the mobile user terminal updates the total remaining amount held by the electronic telephone card that is displayed on the LCD (display accounting 7014).

[0753] Thereafter, each time the communication time exceeds NT (N is a natural number), the electronic telephone card accounting machine transmits, to the mobile user terminal 100, a communication charge message 7015 for an electronic micro-check for which the face value is the amount charged for the communication fee $(N + 1)V$ for the communication time $(N + 1)T$, instead of transmitting the telephone micro-check having a face value NV. The mobile user terminal thereafter further subtracts the communication fee V from the total remaining amount held by the electronic telephone card, and generates and transmits, to the switching center, a telephone micro-check 7016 for which the communication fee $(N + 1)V$ is entered as the face value. The electronic telephone card accounting machine examines the contents of the electronic telephone micro-check 7016 that is received, and generates and transmits, to the mobile user terminal, a receipt 7017, which is a message corresponding to a receipt for the electronic micro-check 7016. Upon receiving the receipt 7017, the mobile user terminal updates the total remaining amount held by the electronic telephone card that is displayed on the LCD (display accounting 7018).

[0754] The messages, such as the call reception request 7005 and the call reception response 7008, that are exchanged by the switching center 105 and the telephone terminal 115 depend on the protocol established for the line connection between the switching center 105 and the telephone terminal 115.

[0755] The payment card reference processing is shown in Fig. 73.

[0756] The telephone card reference process is not performed in accordance with a special processing sequence, but is performed during the data updating processing, when the service providing system updates the data in the electronic telephone card accounting machine.

[0757] When a time that has been set in advance is reached, the electronic telephone card accounting machine automatically initiates the data updating process, and transmits, to the service providing system, a data update request 5702, which is a message requesting that the data updating process be performed.

[0758] The service providing system thereafter transmits, to the electronic telephone card accounting machine, a data update response 5703, which is a message transmitted as a reply to the data update request 5702 that was received.

[0759] The data update response 5703 includes information indicating the range of the data that is to be uploaded (update option code 8809: Fig. 88B). Upon receiving the data update response 5703, the electronic telephone card accounting machine generates and transmits, to the service providing system, upload data 5704, which is a message in which is included the data that is to be uploaded to the service

providing system. At this time, the upload data 5704 includes information for a new telephone micro-check that is processed during the telephone card clearing process.

[0760] In the service providing system, the service server 900 compares the received upload data 5704 with the data in the merchant information server 903, and generates data for updating the electronic telephone card accounting machine. Then, the service server 900 transmits, to the electronic telephone card accounting machine, an update data message 5705 that includes the data for updating the electronic telephone card accounting machine.

[0761] The electronic telephone accounting machine develops the update data that is included in the received update data message 5705, and updates the internal data.

[0762] The service providing system also compares information for the telephone micro-check with the management information that is stored in the service director information server 901 for the registered electronic telephone card, and examines the telephone micro-check to determine whether it is valid. The telephone card reference results are transmitted to a communication service provider by electronic mail or by regular mail.

[0763] If the firm represented by the communication service provider differs from that represented by the telephone card issuer, and a payment for the communication service provider who handles the telephone micro-check is made by the telephone card issuer, or if the usage of the telephone card is periodically reported to the telephone card issuer in accordance with the terms of a contract, in accordance with the results that are obtained by the telephone card reference process, the service providing system, for example, weekly generates a usage condition notification 7300, which is a message notifying the telephone card issuer of the telephone card usage condition, and transmits it to the telephone card issuing system 109.

[0764] In Fig. 76 is shown the telephone card transfer processing.

[0765] In Fig. 76 is shown a case where user A transfers an electronic telephone card to user B. The basic processing is the same whether infrared communication or digital wireless communication is employed by the users A and B.

[0766] First, an explanation will be given when infrared communication is employed between the users A and B.

[0767] The telephone card transfer process is initiated when the users A and B orally agree to the transfer of an electronic telephone card.

[0768] First, user A sets the mobile user terminal to the telephone card mode, and employs the function switch (F1 or F2) to display on the LCD a telephone card that is to be transferred. User A depresses the function switch (F3) to display the operating menu for the electronic telephone card, and selects "telephone card transfer." Thereafter, the user A depresses the execution switch while directing the infrared communication port toward the infrared communication port of the mobile user terminal of user B (telephone card transfer operation 7600). Then, via infrared communication, the mobile user terminal belonging to user A transmits, to the mobile user terminal belonging to user B, a telephone card transfer offer 7601, which is a message offering to transfer an electronic telephone card.

[0769] Upon receiving the telephone card transfer offer 7501, the mobile user terminal belonging to user B examines the contents of the telephone card transfer offer 7601, and displays on the LCD the contents of the electronic telephone card that is to be transferred (display transfer offer: 7602).

[0770] User B confirms the contents displayed on the LCD, and depresses the execution switch, while directing the infrared communication port toward the infrared communication port of the mobile user terminal belonging to user A (transfer offer acceptance operation 7603). Then, via infrared communication, the mobile user terminal belonging to user B transmits, to the mobile user terminal belonging to user A, a telephone card transfer offer response 7604, which is a message transmitted in response to the telephone card transfer offer 7601. The mobile user terminal of user A displays on the LCD the contents of the telephone card transfer offer response 7604 (display the transfer offer response: 7605) that has been received. In addition, via infrared communication, the mobile user terminal of user A transmits to the mobile user terminal of user B a telephone card transfer certificate 7606, which is a message corresponding to a

certificate for the transfer of the electronic telephone card to user B.

[0771] The mobile user terminal of user B examines the telephone card transfer certificate 7606 that has been received, and via infrared communication transmits a telephone card receipt 7607, which is a message stating that the electronic telephone card has been transferred, to the mobile user terminal of user A.

[0772] Upon receiving the telephone card receipt 7607, the mobile user terminal of user A displays on the LCD a transfer completion message (display transfer completion: 7608). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0773] After transmitting the telephone card receipt 7607, the mobile user terminal of user B displays on the LCD the telephone card transfer certificate 7606 that has been received. The mobile user terminal also displays a dialogue message to ask the user whether the transfer process with the service server (the process for downloading a transferred electronic telephone card from the service providing system) should be performed immediately (display the transfer certificate: 7609).

[0774] The dialogue message includes two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process being performed with the service providing system is canceled. During the process (data updating process) wherein the service providing system updates the data in the mobile user terminal of user B, the electronic telephone card that has been transferred is set up as a part of the update data for the mobile user terminal of user B.

[0775] When user B selects "transfer request" (transfer request operation 7610), the mobile user terminal employs the telephone card transfer certificate 7606 to generate a telephone card transfer request 7611, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7611 to the service providing system via digital wireless telephone communication.

[0776] The service providing system examines the contents of the telephone card transfer request 7611 that has been received, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a telephone card transfer message 7612 that includes the electronic telephone card that was transferred by user A.

[0777] Upon receiving the telephone card transfer message 7612, the mobile user terminal of user B displays the electronic telephone card on the LCD (display the electronic telephone card; 7613). The telephone card transfer processing is thereafter terminated.

[0778] Next, an explanation will be given for digital wireless telephone communication between users A and B.

[0779] For this type of communication, the telephone card transfer process is also initiated when users A and B orally agree on the transfer of an electronic telephone card. At this time, users A and B are using digital wireless telephones to communicate with each other.

[0780] First, user A sets the mobile user terminal to the telephone card mode and employs the function switch (F1 or F2) to display on the LCD a telephone card to be transferred. User A then depresses the function switch (F3) to display the operating menu for the electronic telephone card. The user selects "telephone card transfer" and depresses the execution switch (telephone card transfer operation 7600). Then, via digital wireless telephone communication, the mobile user terminal of user A transmits, to the mobile user terminal of user B, a telephone card transfer offer 7601, which is a message offering to transfer an electronic telephone card.

[0781] Upon receiving the telephone card transfer offer 7601, the mobile user terminal of user B examines the contents of the telephone card transfer offer 7601, and displays on the LCD the contents of the electronic telephone card that is to be transferred (display transfer offer; 7602).

[0782] The user B confirms the contents displayed on the LCD, and depresses the execution switch (transfer offer acceptance operation 7603). Then, through digital wireless telephone communication, the mobile user terminal of user B transmits, to the mobile user terminal of user A, a telephone card transfer offer response 7604, which is a response message for the telephone card transfer offer 7601.

[0783] The mobile user terminal of user A displays on the LCD the contents of the received telephone card transfer offer response 7604 (display the transfer offer response: 7605). Thereafter, via digital wireless telephone communication, the mobile user terminal transmits to the mobile user terminal of user B a telephone card transfer certificate 7606, which is a message corresponding to a certificate for the transfer of the electronic telephone card to user B.

[0784] The mobile user terminal of user B examines the received telephone card transfer certificate 7606 and via digital wireless telephone communication transmits a telephone card receipt 7607, which is a message stating that the electronic telephone card has been transferred to user B, to the mobile user terminal of user A.

[0785] Upon receiving the telephone card receipt 7607, the mobile user terminal of user A displays a transfer completion message on the LCD (display transfer completion: 7608). The processing for the mobile user terminal of user A (sender) is thereafter terminated.

[0786] After transmitting the telephone card receipt 7607, the mobile user terminal of user B displays on the LCD the received telephone card transfer certificate 7606. Also, the mobile user terminal displays a dialogue message asking the user whether the transfer process with the service server (the process for downloading a transferred electronic telephone card from the service providing system) should be performed immediately (display the transfer certificate: 7609).

[0787] Included in the dialogue message are two operating menus: "transfer request" and "cancel." When "cancel" is selected, the current transfer process that is being conducted with the service providing system is canceled. During the process (data updating process) whereby the service providing system updates the data in the mobile user terminal of user B, the electronic telephone card that has been transferred is set in the mobile user terminal of user B as a part of the update data.

[0788] When the user B selects "transfer request" (transfer request operation 7610), the mobile user terminal disconnects the communication line leading from user A and connects the digital wireless telephone communication line with the service providing system. Then, the mobile user terminal employs the telephone card transfer certificate 7606 to generate a telephone card transfer request 7611, which is a message requesting the transfer process be performed with the service providing system, and transmits the request 7611 to the service providing system via digital wireless telephone communication.

[0789] The service providing system examines the contents of the received telephone card transfer request 7611, and via digital wireless telephone communication, transmits to the mobile user terminal of user B a telephone card transfer message 7612 that includes the electronic telephone card that is being transferred by user A.

[0790] Upon receiving the telephone card transfer message 7612, the mobile user terminal of user B displays the electronic telephone card on the LCD (display the electronic telephone card: 7613). The telephone card transfer processing is thereafter terminated.

[0791] In Fig. 79 is shown the electronic telephone card installation processing.

[0792] First, the user sets the mobile user terminal to the telephone card mode and employs the function switch (F4) to display the operating menu for the telephone card mode. The user then selects "install" and displays the installation screen on the LCD. Thereafter, the user employs the number key switches to enter the installation card number and the installation number that are printed on the electronic telephone card installation card, and depresses the execution switch 311 (installation operation 7900). The mobile user terminal then transmits to the service providing system 110 an installation request 7901, which is a message requesting the installation of an electronic telephone card.

[0793] The service providing system 110 specifies an installation card issuer by referring to the installation card number that is included in the received electronic telephone card installation request 7901, and transmits to the telephone card issuing system of that issuer a telephone card installation request 7902, which is a message requesting that a telephone card be issued.

[0794] In the telephone card issuing system, the telephone card issuing server 1300 compares the installation card number and the installation number, which are included in the telephone card installation request 7902 that has been received, with the management information that is stored in the telephone card

issuing information server 1302 for the electronic telephone card installation cards that have been issued. In addition, the telephone card issuing server 1300 updates the data in the customer information server 1301, in the telephone card issuing information server 1302, and in the telephone card information server 1303. The telephone card issuing server 1300 then generates the data for the requested telephone card, and transmits to the service providing system an electronic telephone card installation commission 7903, which is a message requesting the installation of an electronic telephone card that corresponds to the telephone card that has been requested.

[0795] Upon receiving the electronic telephone card installation commission 7903, the service providing system generates an electronic telephone card, and to install the electronic telephone card in the mobile user terminal, transmits to the mobile user terminal an electronic telephone card installation message 7904.

[0796] The mobile user terminal installs the electronic telephone card that is included in the received electronic telephone card installation message 7904, and displays on the LCD the installed electronic telephone card (display the electronic telephone card: 7905).

[0797] A detailed explanation will be given later for the contents of the messages that are exchanged by the devices during the above electronic telephone card service processing.

[0798] The electronic credit card service will now be described.

[0799] The electronic credit card service includes two settlement processes: a network credit settlement process, for a credit clearance for the price of a product for the purchase of a ticket, for a payment card purchase and for telephone card processes; and a real credit settlement process for a credit clearance at a common retail shop, etc. Since the network credit settlement processing has been described for the purpose of a ticket purchase, for a payment card purchase and for telephone card purchase processes, the real credit settlement processing will now be described.

[0800] In Fig. 84 is shown the real credit settlement processing.

[0801] First, the user notifies the merchant that an electronic credit card will be employed for the payment (instruct settlement to be made with an electronic credit card: 8400).

[0802] The merchant depresses the credit card settlement switch 513 (the function switch F3 for the merchant terminal 103) (depress the credit card settlement switch: 8401), and permits the user to start the payment operation (instruct the start of the payment operation: 8403). At this time, the total charge and a message indicating that the merchant terminal is waiting for the user to initiate the payment operation to be performed by the user are displayed on the LCD of the merchant terminal 102 or 103 (display "waiting for the payment operation": 8402).

[0803] The user sets the mobile user terminal to the credit card mode, employs the function switch (F1 or F2) to display a payment card to be used for the payment, and enters the amount to be paid and the number of payments. Then, while directing the infrared communication port 300 to the infrared communication module of the merchant terminal (the infrared communication port for the merchant terminal 103) (payment operation 8404), the user depresses the execution switch 311.

[0804] The mobile user terminal generates a payment offer 8405 that includes the credit card type, the amount to be paid and the number of payments that are entered by the user, and that is a message offering to pay the merchant the quoted price. The payment offer 8405 is transmitted to the merchant terminal via infrared communication.

[0805] Upon receiving the payment offer 8405, the merchant terminal examines the type of credit card and the amount of the payment, and via infrared communication, transmits to the mobile user terminal a payment offer response 8406, which is a response message for the payment offer 8405. In addition, via digital telephone communication the merchant terminal transmits, to the service providing system 110, an authorization request 8409, which is a message requesting an authorization for the user. At this time, the message indicating that the authorization process is in progress is displayed on the LCD of the merchant terminal (display "authorization process in progress": 8407).

[0806] The mobile user terminal 100 receives the payment offer response 8406 from the infrared

communication port 300, and compares the amount charged included in the response 8406 with the amount of the payment. Then, via digital wireless telephone communication, the mobile user terminal transmits, to the service providing system 110, a payment request 8410, which is a message requesting that the payment of a price using credit be permitted. At this time, a message indicating the payment process is in progress is displayed on the LCD of the mobile user terminal (display "payment process in progress": 8408).

[0807] The service providing system 110 receives the authorization request 8409 from the merchant terminal and the payment request 8410 from the mobile user terminal 100, and compares the two. In addition, the service providing system 110 examines the credit state of the user, and generates and transmits, to the merchant terminal, an authorization response 8411, which is a response message for the authorization request.

[0808] Upon receiving the authorization response 8411 from the service providing system 110, the merchant terminal displays, on the LCD, the contents of the authorization response 8411, and notifies the operator (merchant) of the authorization results (display the authorization results 8412).

[0809] The operator (merchant) confirms the contents of the authorization, depresses the execution switch of the merchant terminal, and instructs the start of the settlement process (settlement process request operation 8413). Then, via digital telephone communication, the merchant terminal transmits, to the service providing system 110, a clearance request 8415, which is a message requesting the settlement, and displays on the LCD a message indicating the settlement is in process (display "settlement process in progress": 8414).

[0810] The service providing system 110 receives the clearance request 8415 from the merchant terminal, and transmits, to the transaction processing system 106, a clearance request 8416, which is a message requesting the performance of the credit settlement process by the transaction processing system 106.

[0811] Upon receiving the clearing request 8416 at the transaction processing system, the transaction server 1000 updates the data in the subscriber information server 1001, in the member store information server 1002 and in the transaction information server 1003, and performs the credit settlement process. Then, a clearing completion notification 8417. which is a message stating that the settlement process has been completed is transmitted to the service providing system.

[0812] Upon receiving the clearing completion notification 8417, the service providing system generates a clearing completion notification 8418, which is a message stating that the settlement process has been completed, and transmits it to the merchant terminal.

[0813] Upon receiving the clearing completion notification 8418, the merchant terminal generates a receipt message 8419, which corresponds to a receipt, and transmits it to the service providing system. The merchant terminal also displays on the LCD the contents of the clearing completion notification 8419 in order to notify the operator (merchant) that the settlement process has been completed (display clearing completion: 8420).

[0814] Upon receiving the receipt message 8419, the service providing system generates a receipt message 8421, and transmits it to the mobile user terminal.

[0815] The mobile user terminal 100 displays, on the LCD, the contents of the receipt 8421 that has been received, and notifies the user of the completion of the settlement process (display the receipt: 8422).

[0816] A detailed explanation will be given later for the messages that are exchanged by the devices during the above electronic credit card service process.

[0817] The internal structure of the mobile user terminal 100 will now be described.

[0818] Fig. 15 is a block diagram illustrating the arrangement of the mobile user terminal 100. This terminal 100 comprises: a CPU (Central Processing Unit) 1500, which employs a program stored in a ROM (Read Only Memory) 1501 to process data for transmission and for reception, and to control the other components via a bus 1529; a RAM (Random Access Memory) 1502, in which are stored data that are processed and that are to be processed by the CPU 1500; a EEPROM (Electric Erasable Programmable Read Only Memory) 1503, in which are stored a terminal ID and a telephone number for the mobile user terminal 100

when used as a wireless telephone terminal, a user ID, a code number for a user, a private key and a public key for a digital signature, a service provider ID, and the telephone number and the public key of the service providing system 110 (the digital signature of the service provider is accompanied by the telephone number of the service providing system); an LCD controller 1504, which operates the LCD 303 under the control of the CPU 1500, and which displays on the LCD an image that is set up by the CPU 1500; a cryptographic processor 1505, which encrypts and decrypts data under the control of the CPU 1500; a data codec 1506, which under the control of the CPU 1500 encodes data to be transmitted and decodes data that is received; an infrared communication module 1507, which transmits and receives infrared rays during infrared communication; a key operator 1509, which detects the manipulation by the user of the mode switch 304, the speech switch 305, the end switch 306, the function switch 307, the number key switch 308, the power switch 309 and the execution switch 311; an audio processor 1511, which drives a loudspeaker 1510, a receiver 302 or a headphone set that is connected to a headphone jack 312, and amplifies an analog audio signal that is input through the microphone 310 or the headphone head; an audio codec 1512, which encodes an analog audio signal 1542 to provide digital audio data, and decodes digital audio data to provide an analog audio signal 1543; a channel codec 1513, which generates data to be transmitted along a radio channel, and which extracts, from received data, data that is addressed to the mobile user terminal 100; a modulator 1514, which modulates a serial digital signal 1547 input by the channel codec 1513 to obtain an analog transmission signal 1549 that employs as a baseband an electric signal 1552 that is transmitted by a PLL 1516; a demodulator 1515, which, to obtain a serial digital signal 1548, demodulates a received analog signal 1550 while employing as a baseband an electric signal 1553 that is supplied by the PLL 1516, and which transmits the serial digital signal 1548 to the channel codec 1513; an RF unit 1517, which changes the analog transmission signal 1549 received from the modulator 1514 into a radio wave and outputs it through an antenna 301, and which, upon receiving a radio wave through the antenna 301, transmits an analog reception signal 1550 to the demodulator 1515; a battery capacity detector 1518, which detects the capacity of the battery of the mobile user terminal 100; and a control logic unit 1508, which activates the channel codec 1513, the PLL 1516 and the RF unit 1517, and which processes interrupt signals, transmitted by the key operator 1509, the channel codec 1513 and the battery capacity detector 1518, and serves as an interface when the CPU 1500 accesses the internal registers of the key operator 1509, the audio processor 1511, the audio codec 1512 and the channel codec.

[0819] The cryptographic processor 1505 includes a secret key encryption and decryption function and a public key encryption and decryption function. The cryptographic processor 1505 employs a cryptography method determined by the CPU 1500 and the keys to encrypt or decrypt data set by the CPU 1500. The encryption and decryption functions of the cryptographic processor 1505 are employed to perform a digital signature process or a closing process for a message, and to decrypt a closed and encrypted message or to verify a digital signature accompanying a message. A detailed explanation will be given later for the digital signature process, the closing process, the decryption process, and the digital signature verification process.

[0820] The data codec 1506 encodes data to be transmitted or decodes data that is received under the control of the CPU 1500. In this case, the encoding is a process for generating data to be transmitted that includes communication control information and error correction information, and the decoding is a process for performing error correction for the received data and for removing extra communication control information in order to obtain the data that a sender was originally to transmit. The data codec 1506 has a function for encoding or decoding data during data communication performed using a digital wireless telephone, and a function for encoding or decoding data during infrared communication. The data codec 1506 performs encoding or decoding, as determined by the CPU 1500, for data that are set by the CPU 1500.

[0821] When, for example, a closed message accompanied by a digital signature is to be transmitted via digital wireless telephone communication, the CPU 1500 employs the cryptographic processor 1505 to perform a digital signature process and a closing process for a message, employs the data codec 1506 to encode the obtained message to provide a data communication form for a digital wireless telephone, and transmits the resultant message via the control logic unit 1508 to the channel codec 1513.

[0822] When a closed message accompanied by a digital signature is received via digital wireless telephone communication, the CPU 1500 reads that message from the channel codec 1513 through the control logic unit 1508, employs the data codec 1506 to decode the received message, and permits the cryptographic processor 1505 to decrypt the closed and encrypted message and to verify the digital signature accompanying the message.

[0823] Similarly, when a closed message accompanied by a digital signature is to be transmitted via infrared communication, the CPU 1500 employs the cryptographic processor 1505 to provide a digital signature for the message and to close the message, and employs the data codec 1506 to encode the obtained message to provide a data form suitable for infrared communication. Then, the resultant message is transmitted to the infrared communication module 1507.

[0824] When a closed message accompanied by a digital signature is received via infrared communication, the CPU 1500 reads that message from the infrared communication module 1507, employs the data codec 1506 to decode the received message, and permits the cryptographic processor 1505 to decrypt the closed and encrypted message and to verify the digital signature accompanying the message.

[0825] When the user depresses either the mode switch 304, the speech switch 305, the end switch 306, the function switch 307, the number key switch 308, the power switch 309, or the execution switch 311 the key operator 1509 detects the switch manipulation by the user and asserts an interrupt signal 1538 requesting the performance of a process corresponding to the switch that was manipulated. As is shown in Fig. 16A, the key operator 1509 includes a key control register (KEYCTL) 1612 for setting the valid/invalid state of each switch. The CPU 1500 accesses the key control register (KEYCTL) 1612 to set the valid/invalid state of each switch.

[0826] The audio processor 1511 includes an audio control register (SCTL) 1611 for controlling the audio process, as is shown in Fig. 16A. The CPU 1500 accesses the audio control register (SCTL) 1611 to control the audio processor 1511. When, for example, a call request over a digital wireless telephone is received, the CPU 1500 accesses the audio control register (SCTL) 1611 to output a call tone for a digital wireless telephone. As a result, the audio processor 1511 drives the loudspeaker 1510 to release the call tone for a digital wireless telephone. It should be noted that when a call request is from the service providing system 110, no call arrival tone is output, and the CPU 1500 initiates a process for establishing a communication session with the service providing system.

[0827] The audio codec 1512 encodes an analog audio signal 1542 received from the audio processor 1511 to provide digital audio data, and decodes digital audio data received from the channel codec 1513 to provide an analog audio signal 1543. The analog audio signal 1543 is transmitted to the audio processor 1511, which amplifies the signal 1543 and drives the receiver 302 to produce sounds. The encoded digital audio data are transmitted as a digital audio signal 1546 to the channel codec 1513, which converts the data into data that can be transmitted across the radio channel.

[0828] In addition, the audio codec 1512 includes an audio data encryption key register (CRYPT) 1613 in which is stored an encryption key for the secret key cryptography method that is employed for encryption and decryption of audio data. When the audio data encryption key is set to the audio data encryption key register (CRYPT) 1613 by the CPU 1500, the audio codec 1512 encodes the analog audio signal 1542 to provide digital audio data, and at the same time encrypts the digital audio data, or decodes the digital audio data to provide an analog audio signal 1543 while simultaneously decrypting the audio data.

[0829] Two types of data to be transmitted are received by the channel codec 1513: one type is digital audio data originating at the audio codec 1512 as a digital audio signal 1546, and the other type is data-communication data originating at the CPU 1500 that pass through the control logic unit 1508 as a digital signal 1556.

[0830] The channel codec 1513 adds identification data, as header information, to digital audio data and data-communication data, then converts the data into a serial digital signal 1547 having a data format that is suitable for a digital wireless telephone, and transmits the signal 1547 to the modulator 1514.

[0831] In addition, upon receiving a serial digital signal 1548 from the demodulator 1515, the channel codec 1513 examines a terminal ID and extracts only such data as is addressed to the channel codec 1513, removes the communication control information for the digital wireless telephone, identifies the digital audio data and the data-communication data in the header information, and transmits these data as a digital audio signal 1546 and a digital signal 1556 to the audio codec 1512 and the control logic unit 1508 respectively.

[0832] Further, upon receiving a digital wireless call or data-communication data, the channel codec 1513 asserts an interrupt signal 1554, and upon receiving digital audio data, brings the control signal 1544 low. The interrupt signal 1554 is a signal requesting that the CPU 1500 perform a process for a received digital

wireless phone communication and a process for data-communication data. The control signal 1544 is a low-active signal for requesting that the audio codec 1512 process the received digital audio data.

[0833] In order to perform these processes, as is shown in Fig. 16A, the channel codec 1513 includes: an ID register (ID) 1605, in which is stored a terminal ID; a channel codec control register (CHCTL) 1606, which controls the operation of the channel codec 1513; an audio transmission buffer 1607, in which are stored digital audio data received from the audio codec 1512; an audio reception buffer 1608, in which are stored digital audio data extracted from received data; a data transmission buffer 1609, in which are stored data-communication data received from the control logic unit 1508; and a data reception buffer 1610, in which are stored data-communication data extracted from received data.

[0834] A control signal 1545 is a control signal directing the audio codec 1512 to write data to the data transmission buffer 1607 and to read data from the data reception buffer 1608. When the control signal 1545 goes low, the digital audio data are written to the data transmission buffer 1607, and when the control signal 1545 goes high, the digital audio data are read from the data reception buffer 1609.

[0835] A control signal 1555 is a control signal with which the CPU 1500 directs the channel codec 1513, via the control logic unit 1508, to write data to the data transmission buffer 1609 and to read data from the data reception buffer 1610. When the control signal 1555 goes low, the data-communication data are written to the data transmission buffer 1609, and when the control signal 1555 goes high, the data-communication data are read from the data reception buffer 1610.

[0836] The modulator 1514 modulates a serial digital signal 1547 received from the channel codec 1513 to provide an analog transmission signal 1549, which is employed as a baseband for an electric signal 1552 that is supplied by the PLL 1516, and transmits the signal 1549 to the RF unit 1517. The analog transmission signal 1549 received by the RF unit 1517 is output as a radio wave through the antenna 301.

[0837] When a radio wave is received at the antenna 301, an analog reception signal 1550 is transmitted by the RF unit 1517 to the demodulator 1515. The demodulator 1515 demodulates the analog signal 1550, while employing as its baseband an electric signal 1553 that is supplied by the PLL 1516, and transmits an obtained serial digital signal 1548 to the channel codec 1513.

[0838] The battery capacity detector 1518, for detecting the capacity of a battery, asserts an interrupt signal 1557 when the remaining capacity of the battery of the mobile user terminal 100 is equal to or less than a value Q (Q > 0) that is set by the CPU 1500. The interrupt signal 1557 is a signal for requesting that the CPU 1500 perform a data backup process for the RAM 1502. The value Q is large enough to enable the mobile user terminal 100 to communicate with the service providing system 110 in order to back up data in the RAM 1502 for the service providing system 110 (data backup process).

[0839] The control logic unit 1508, as is shown in Fig. 16A, includes five internal registers: a frame counter (FRAMEC) 1600, a start frame register (FRAME) 1601, a clock counter (CLOCKC) 1602, an update time register (UPTIME) 1603, and an interrupt register (INT) 1604.

[0840] The frame counter 1600 is employed to count the number of frames for the digital wireless telephone; the start frame register 1601 is employed to store the frame number of the frame that is to be activated next; the clock counter 1602 is employed to measure the current time; the update time register 1603 is employed to store the time at which the mobile user terminal 100 will communicate with the service providing system 110 to update data in the RAM 1502 (data updating process); and the interrupt register 1604 is employed to indicate the reason an interrupt was generated for the CPU 1500.

[0841] Generally, to receive a call the digital wireless telephone intermittently acquires control data for a control channel and compares it with the terminal ID. The mobile user terminal 100 employs the frame counter 1600 and the start frame register 1601 to intermittently acquire control data. First, the frame number of the frame to be activated next is stored in advance in the start frame register 1601, and when the count value of the frame counter 1600 equals the amount held by the start frame register 1601, to acquire control data the control logic unit 1508 activates the channel codec 1513, the PLL 1516 and the RF unit 1517 via an address data signal line 1558.

[0842] When the value of the clock counter 1602 matches the amount in the update time register 1603, or when one of the interrupt signals 1558, 1554 and 1557 is asserted, the control logic unit 1508 writes the reason for the interrupt in the interrupt register (INT) 1604, and asserts an interrupt signal 1519 requesting

that the CPU 1500 perform an interrupt process. For the interrupt processing, the CPU 1500 reads the reason stored in the interrupt register (INT) 1604 and then performs a corresponding process.

[0843] The individual bit fields of the interrupt register (INT) 1604 are defined as is shown in Fig. 16B.

[0844] Bit 31 represents the state of the power switch 309. When the bit value is 0, it indicates the state is the power-OFF state, and when the bit value is 1, it indicates the state is the power-ON state.

[0845] Bit 30 represents the digital wireless telephone communication state. When the bit value is 0, it indicates the state is one wherein no digital wireless telephone communication is being performed, and when the bit value is 1, it indicates the state is one wherein digital wireless telephone communication is in progress.

[0846] Bit 29 represents the generation of a frame interrupt requesting the intermittent acquisition of control data. When the bit value is 1, it indicates a condition that exists when a frame interruption has occurred. In this bit field, a 1 is set when the amount in the frame counter 1600 equals the amount held in the start frame register 1601.

[0847] Bit 28 represents the generation of a call arrival interrupt. When the bit value is 1, it indicates that a digital wireless call has arrived. In this bit field, a 1 is set when the terminal ID is matched and the interrupt signal 1554 is asserted during the intermittent acquisition of control data for the digital wireless phone.

[0848] Bit 27 represents the generation of a data reception interrupt. When the bit value is 1, it indicates that data is being received. In this bit field, a 1 is set when the data-communication data are received and the interrupt signal 1554 is asserted during the course of digital wireless telephone communication.

[0849] Bit 26 represents the generation of an update interrupt requesting the performance of a data updating process. When the bit value is 1, it indicates the generation of the update interrupt. In this bit field, a 1 is set when the amount in the clock counter 1602 matches the amount in the update time register 1603.

[0850] Bit 25 represents the generation of a battery interrupt requesting a backup process. When the bit value is 1, it represents the generation of the battery interrupt. In this bit field, a 1 is set when the interrupt signal 1557 received from the battery capacity detector 1518 is asserted.

[0851] Bit 24 represents the generation of a key interrupt by the manipulation of the switch. When the bit value is 1, it represents the generation of the key interrupt.

[0852] Bits 0 to 9 correspond to switches 0 to 9 for the number key switch 208. Bit 10 and bit 11 correspond to number key switches "*" and "#" and bits 12 to 15 corresponds to function switches F1 to F4. Bits 16 to 20 respectively correspond to the power switch 309, the execution switch 311, the mode switch 304, the speech switch 305, and the end switch 306. When the amount of a bit is 1, it indicates that a switch corresponding to that bit has been depressed.

[0853] Data stored in the RAM 1502 will now be described.

[0854] Fig. 17 is a specific diagram showing a RAM map for data stored in the RAM 1502.

[0855] The RAM 1502 is constituted by five areas: a fundamental program objects area 1700, a service data area 1701, a user area 1702, a work area 1703, and a temporary area 1704. In the fundamental program objects area 1700 are stored an upgraded module for a program stored in the ROM 1501, a patch program, and an additional program.

[0856] The user area 1702 is an area that can be freely used by a user, the work area 1703 is a work area that the CPU 1500 employs when executing a program, and the temporary area 1704 is an area in which information received by the mobile user terminal 100 is stored temporarily. The service data area 1701 is an area in which is stored contract information for the mobile electronic commerce service, electronic ticket information, electronic payment card information, electronic telephone card information, electronic credit card information, and history information; the data in this area are managed by the service providing system 110.

[0857] The service data area 1701 is constituted by 12 sub-areas: a data management information area

1705, a personal information area 1706, a portrait image data area 1707, a user public key certificate area 1708, a user preference area 1709, a telephony information area 1710, a credit card list area 1711, a ticket list area 1712, a payment card list area 1713, a telephone card list area 1714, a use history area 1715, and an object data area 1716. The data management information area 1705 is an area in which is stored management information for data stored in the service data area 1701; the personal information area 1706 is an area in which are stored the name, age and gender of a user; the portrait image data area 1707 is an area in which the portrait image data for the face of a user are stored; the user public key certificate area 1708 is an area in which a public key certificate for a user is stored; the user preference area 1709 is an area in which is stored preference information for a user concerning the mobile electronic commerce service; the telephony information area 1710 is an area in which information concerning a digital wireless telephone is stored; the credit card list area 1711 is an area in which is stored list information for credit cards registered by a user; the ticket list area 1712 is an area in which is stored list information for electronic tickets owned by a user; the payment card list area 1713 is an area in which is stored list information for electronic payment cards owned by a user; the telephone card list area 1714 is an area in which is stored list information for electronic telephone cards owned by a user; the use list area 1715 is an area in which is stored use history information for the mobile electronic commerce service; and the object data area 1716 is an area in which are stored object data for information managed in the other eleven areas.

[0858] The private key and the public key that are used for the digital signature of a user are updated periodically, or semi-periodically. At this time, the public key certificate for the user stored in the user public key certificate area 1708 is also updated.

[0859] The information stored in the service data area 1701 will now be described in detail.

[0860] Fig. 18 is a detailed, specific diagram showing the relationship existing between information stored in the service data area 1701.

[0861] The data management information 1705 consists of thirteen types of information: a last data update date 1800, a next data update date 1801, a terminal status 1802, a personal information address 1803, a portrait image data address 1804, a user public key certificate address 1805, a user preference address 1806, a telephony information address 1807, a credit card list address 1808, a ticket list address 1809, a payment card list address 1810, a telephone card list address 1811, and a use list address 1812.

[0862] The last data update date 1800 represents the date on which the service providing system 110 last updated the data in the RAM 1502, and the next data update date 1801 represents the date on which the service providing system 110 will next update data in the service data area 1701.

[0863] The amount of the next data update date 1801 is set in the update time register 1603. When the next data update date 1801 is reached, the mobile user terminal 100 initiates the data updating process. During the data updating process, the service providing system 110 updates data stored in the RAM 1502. This process is performed daily during a period (e.g., late at night) in which communication traffic is not very heavy. The data updating process will be described in detail later.

[0864] The terminal status 1802 represents the status of the mobile user terminal 100; and the personal information address 1803, the portrait image data address 1804, the user public key certificate address 1805, the user preference address 1806, the telephony information address 1807, the credit card list address 1808, the ticket list address 1809, the payment card list address 1810, the telephone card list address 1811, and the use list address 1812 respectively represent the first addresses of the areas in which are stored personal information 1706, portrait image data 1707, a user public key certificate 1708, user preference information 1709, telephony information 1710, a credit card list 1711, a ticket list 1712, a payment card list 1713, a telephone card list 1714, and a use list 1715.

[0865] The telephony information 1710 consists of three types of information: a last called number 1813, an address book address 1814, and a shortcut file address 1815. The last called number 1813 represents a telephone number employed for a prior call, and is employed when re-dialing a digital wireless telephone. The address book address 1814 and the shortcut file address 1815 respectively represent addresses in the object data area at which address book information and a shortcut file are stored.

[0866] The credit card list 1711 includes list information for credit cards that are registered by a user. In the credit card list 1711, seven types of information are entered for each credit card: a credit card name 1816, a

credit card number 1817, an effective period 1818, a credit card status 1819, an image data address 1820, an object data address 1821, and an access time 1822.

[0867] The credit card status 1819 indicates whether or not the credit card is effective, and also the credit limit, while the image data address 1820 represents an address in the object data area 1716 at which image data for the credit card are stored. The object data address 1821 represents an address at which are stored object data for a program for the credit card, and the access time 1822 represents the last time that the user employed the credit card.

[0868] At the object data address 1821 is stored a local address that is an address in the object data area 1716, or a remote address that is an address in the user information server 902 of the service providing system 110. When a remote address is stored at the object data address 1821, and when the user selects a corresponding credit card, the mobile user terminal 100 downloads object data from the service providing system 110 to the temporary area 1704 (remote access), and executes a program for the credit card. In order to simply display the credit card, the image data at the image data address 1820 in the object data area 1716 are displayed, and object data are not downloaded.

[0869] An address to be stored at the object data address 1821 is determined by the service providing system 110. In the data updating process, the access times for the individual credit cards are compared, and a local address is assigned for the credit card having the latest access time. When there is adequate space in the object data area 1716, the object data addresses of all the credit cards can be local addresses.

[0870] The list information for the electronic tickets owned by the user is stored in the ticket list area 1712. In the ticket list area 1712 are stored five types of information: ticket name information 1823, ticket ID information 1824, ticket status information 1825, electronic ticket address information 1826, and access time information 1827.

[0871] The ticket name 1823 and the ticket ID 1824 represent the name and the ID of an electronic ticket. The ticket status 1825 represents the state of an electronic ticket, concerning whether it can be employed or whether it has been examined. The electronic ticket address 1826 represents an address at which an electronic ticket is stored. And the access time 1827 is the time at which the user last accessed the electronic ticket.

[0872] The list information for electronic payment cards owned by the user is stored in the payment card list area 1713. In the payment card list area 1713 are stored six types of information: card name information 1828, card ID information 1829, card status information 1830, remaining card amount information 1831, electronic payment card address information 1832, and access time information 1833.

[0873] The card name 1828 and the card ID 1829 represent the name and the ID of an electronic payment card. The card status 1830 represents the state of an electronic payment card, concerning whether it can be employed or whether its credit is exhausted. The remaining card amount 1831 represents the remaining amount that is held by an electronic payment card. The electronic payment card address 1832 represents an address at which an electronic payment card is stored. And the access time 1832 is the time at which the user last accessed the electronic payment card.

[0874] The list information for electronic telephone cards owned by the user is stored in the telephone card list area 1714. In the telephone card list area 1714 are stored six types of information: card name information 1834, card ID information 1835, card status information 1836, remaining card amount information 1837, electronic telephone card address information 1838, and access time information 1840.

[0875] The card name 1834 and the card ID 1835 represent the name and the ID of an electronic telephone card. The card status 1836 represents the state of an electronic telephone card, concerning whether it can be employed or whether its credit is exhausted. The remaining card amount 1837 represents the remaining amount that is held by the electronic telephone card. The electronic telephone card address 1838 represents an address at which an electronic telephone card is stored. And the access time 1839 is the time at which the user last accessed the electronic telephone card.

[0876] A local address indicating an address in the object data area 1716, or a remote address indicating an address in the user information server 902 of the service providing system 110, is stored at the electronic ticket address 1826, the electronic payment card address 1832 and the electronic telephone card

address 1838.

[0877] When a remote address is stored at the electronic ticket address 1826, and when the user accesses the electronic ticket, the mobile user terminal 100 downloads object data from the service providing system 110 to the temporary area 1704 (remote access) and displays the data on the LCD 303. Similarly, when a remote address is stored at the electronic payment card address 1832 or the electronic telephone card address 1837, and when the user accesses the electronic payment card or the telephone card, the mobile user terminal 100 downloads object data from the service providing system 110 to the temporary area 1704 (remote access), and displays the data on the LCD 303.

[0878] Addresses to be stored at the electronic ticket address 1826, the electronic payment card address 1832 and the electronic telephone card address 1838 are determined by the service providing system 110. In the data updating process, the access times are compared and a local address is assigned for the electronic ticket, the electronic payment card and the electronic telephone card having the latest access times. When there is adequate space available in the object data area 1716, the object data addresses of all the credit cards can be local addresses.

[0879] In the use list 1715, four types of information are stored for one mobile electronic commerce service: request number information 1840, service code information 1841, use time information 1842, and use information address information 1843. The request number 1840 uniquely represents (as regards the user) the mobile electronic commerce service provided for the user. The service code 1841 is a code number that indicates the type of service that is provided. The use time 1842 is the time at which the mobile electronic commerce service is provided. And the use information address 1843 is an address at which a receipt, or information indicating the contents of the use, is stored.

[0880] At the use information address 1843 is stored a local address, which is an address in the object data area 1716, or a remote address, which is an address in the user information server 902 of the service providing system 110. When a remote address is stored at the use information address 1843, and when the user accesses the use information, the mobile user terminal 100 downloads the use information from the service providing system 110 to the temporary area 1704 and displays it on the LCD 303.

[0881] The address stored at the use information address 1843 is also determined by the service providing system. In the data updating process, the use times for the individual use information items are compared, and a local address is assigned for the use information having the latest use time. When there is adequate space available in the object data area 1716, all the use information addresses can be local addresses.

[0882] An explanation will now be given for the data structures of an electronic ticket, an electronic payment card and an electronic telephone card.

[0883] Fig. 19 is a specific diagram showing the data structure of an electronic ticket 1900. In Fig. 19, the electronic ticket 1900 consists of three portions: a ticket program 1901, a presentation ticket 1902 and a ticket certificate 1903 or 1933 portion. The ticket program 1901 portion is information for managing the status of a ticket and for specifying an operation inherent to a ticket. The presentation ticket 1902 portion is information that is to be presented to the gate terminal 101 as information for the contents of a ticket for the examination of an electronic ticket. The ticket certificate is issued by a service provider for an electronic ticket, and indicates that the electronic ticket is authentic. There are two types of ticket certificates: a ticket certificate 1903 for simply certifying an electronic ticket, and a registered ticket certificate 1933 for certifying that an electronic ticket is registered in the service providing system. The ticket certificate 1903 can be changed to the registered ticket certificate 1933 when the user registers an electronic ticket.

[0884] One electronic ticket includes three key types and four different keys in accordance with the public key cryptography method. One key type is a key used for a digital signature accompanying an electronic ticket, and a ticket signature private key 1910 and a ticket signature public key 1925 (1936) are provided as a private key and a corresponding public key. Another key type is a ticket private key 1911 used for the electronic ticket authorization process performed with the gate terminal 101. The other key type is a gate public key 1912 used for the authorization process for the gate terminal 101 performed by the mobile user terminal 100.

[0885] The ticket signature private key 1910 and the ticket signature public key 1925 (1936) are a key pair that differs for each electronic ticket. The ticket private key 1911 and the gate public key 1912 differ for each ticket type. The gate terminal 101 includes a ticket public key and a gate private key that correspond

to the ticket private key 1911 and the gate public key 1912. The method for employing these keys will be described in detail later.

[0886] In Fig. 19, first, the ticket program 1901 includes ten items of information: ticket program header 1904, ticket name 1905, ticket ID 1906, ticket status 1907, variable ticket information 1908, ticket examination number 1909, ticket signature private key 1910, ticket private key 1911, gate public key 1912 and ticket program data 1913 information.

[0887] The ticket program header 1904 is header information indicating that the entry is a ticket program and describing the data structure of the ticket program. The ticket name 1905 and the ticket ID 1906 are the name and the ID of an electronic ticket. The ticket ID is identification information that differs for each electronic ticket.

[0888] The ticket status 1907 is information describing the status of an electronic ticket, concerning whether the electronic ticket can be used, whether it has been examined, whether it has been registered, and whether it can be transferred.

[0889] The variable ticket information 1908 is variable information that is optionally set in accordance with the electronic ticket type.

[0890] The ticket examination number 1909 is a number indicating the order for the ticket examination process, and is incremented each time the ticket examination process is performed. For each electronic ticket, an arbitrary number is set as the initial amount for the ticket examination number. The initial amount is managed by the service providing system 110, and is employed as verification data in the ticket reference process. The ticket reference process will be described in detail later.

[0891] The ticket signature private key 1910 is a digital signature private key for the electronic ticket 1900. Similarly, the ticket private key 1911 is used for the authorization process for the electronic ticket 1900, and the gate public key is used for the authorization process for the gate terminal.

[0892] The ticket signature private key 1910 is used, in the ticket examination process and the ticket transfer process, to provide a digital signature for data consisting of the ticket status 1907 and the variable ticket information 1908 for the electronic ticket 1900 in the gate terminal 101 or the mobile user terminal to which the electronic ticket is transferred.

[0893] The ticket program data 1913 is a program module for specifying an operation inherent to the electronic ticket. Various types of tickets are specified by a combination of the ticket program data 1913 and the variable ticket information 1908.

[0894] The program module for specifying a common operation for the electronic ticket is stored in the ROM 1501. The basic operations, such as the exchange of messages with the gate terminal to examine an electronic ticket, the generation of messages to be exchanged and the setting of the ticket status 1907 to be "examined," and the standard format for the display of an electronic ticket on the LCD 303, are defined by the program module that is stored in the ROM 1501.

[0895] The ticket program data 1913 is a program module for specifying the operations inherent to the ticket examination process and inherent to the display process. The ticket program data 1913 consists of three data sets: a transaction module set 1930, a representation module set 1931 and a representative component information set 1932.

[0896] The transaction module 1930 is a program module for specifying the operation inherent to a ticket in the ticket examination process. Various operations in the ticket examination process can be defined by a combination of the variable ticket information 1908 and the ticket information 1917.

[0897] For example, to define an electronic ticket that is equivalent to five coupon tickets, a program module such as the transaction module 1930 is specified, whereby an amount of "5," which corresponds to the number of coupon tickets, is set for the variable ticket information 1908, whereby, at each examination, the number of coupon tickets in the variable ticket information is decremented, and whereby, when the number of coupon tickets reaches "0," the ticket status 1907 is changed to "disabled."

[0898] Further, to specify an electronic ticket that serves as a ticket that is valid for three days from the time

it is first examined, a program module is defined as the transaction module 1930, whereby, when the ticket is first examined, the date of the third day is set in the variable ticket information 1908 as the effective limit, and whereby the effective limit set in the variable ticket information is examined during each examination.

[0899] The transaction module 1930 does not have to be specified if this is not required. When the transaction module 1930 is not defined, it acts as an electronic ticket for the performance of the basic ticket examination process.

[0900] The representation module 1931 is a program module for specifying an operation on the display, such as a location on the LCD 303, data to be displayed and a display form. For example, for the above electronic ticket that serves as a coupon ticket, the location whereat the number of remaining coupon tickets (a amount set in the variable ticket information) is displayed is designated by the representation module 1931.

[0901] The representation module 1931 also does not have to be defined if such is not necessary. When the representation module 1931 is not defined, an electronic ticket is displayed in the standard display format.

[0902] The representative component information 1932 is image information comprising a component of a ticket on the display, such as an illustration, a photo, a map or a background image. The representative component information 1932 does not have to be specified if such is not necessary. When the representative component information 1932 is not specified, the electronic ticket is displayed using only with text information, as is shown in Fig. 3C. When the representative component information 1932 is specified, the electronic ticket is displayed using the standard display format. When the representation module 1931 is specified, the image information included in the representative component information is displayed as an image 313 in accordance with the representation module 1931, as is shown in Fig. 3F.

[0903] The operations attributable to various types of tickets, and the design of an electronic ticket having a high degree of freedom can be specified by a combination consisting of the transaction module 1930, the representation module 1931 and the representative component information 1932.

[0904] The presentation ticket 1902 includes eight information items: a presentation ticket header 1914, a ticket code 1915, a ticket ID 1916, ticket information 1917, a ticket issuer ID 1918, a validity term 1920, a service provider ID 1921, and a ticket issuing date 1922. A digital signature is provided for the ticket ID 1916, the ticket information 1917 and the ticket issuer ID 1918 by the ticket issuer (1919), and a digital signature is provided for the presentation ticket 1902 by the service provider.

[0905] The presentation ticket header 1914 is header information indicating that the pertinent ticket is a presentation ticket and indicating the data structure of the presentation ticket. The ticket code 1915 is code information indicating an electronic ticket type. And the ticket ID 1916 is ID information for an electronic ticket, and is the same information as that given for the ticket ID 1906.

[0906] The ticket information 1917 is ASCII (American Standard Code for Information Interchange) information that indicates the contents of a ticket. In the ticket information 1917, a ticket title, a date, a place, a seating class, a sponsor, information as to whether an electronic ticket can be transferred, and usage condition information, such as the number of coupon tickets when the electronic ticket is used as a coupon ticket, are described using a form to which tag information are added to represent the individual information types. When the standard display format or the representation module 1931 is designated, the ticket information 1917 is displayed on the LCD 303 in accordance with the representation module 1931, as is shown in Fig. 3C or 3F.

[0907] The ticket issuer ID 1918 is ID information that identifies the ticket issuer who issued the pertinent ticket. The validity term 1920 is information concerning the period the electronic ticket 1900 is valid. The service provider ID 1921 is ID information for the service provider. And the ticket issuing date 1922 is information concerning the date on which the service provider issued the electronic ticket 1900.

[0908] The ticket certificate 1903 and the registered ticket certificate 1933 have substantially the same data structure.

[0909] The ticket certificate 1903 includes seven information items: a ticket certificate header 1923, a ticket ID 1924, a ticket signature public key 1925, a ticket certificate ID 1926, a certificate validity term 1927, a

service provider ID 1928, and a ticket certificate issuing date 1929. A digital signature is provided for the ticket certificate 1903 by the service provider.

[0910] The ticket certificate header 1923 is header information labeling this as a ticket certificate and describing the data structure of the ticket certificate. The ticket ID 1924 is ID information for the electronic ticket 1900, and is the same information as that provided by the ticket ID 1906 and the ticket ID 1916.

[0911] The ticket signature public key 1925 is a public key that is paired with the ticket signature private key 1910 for use as the digital signature for the electronic ticket 1900. The ticket certificate ID 1926 is ID information for the ticket certificate 1903. The certificate validity term 1927 is information indicating the period during which the ticket certificate 1903 is valid. The service provider ID 1928 is ID information for identifying the service provider who issued the ticket certificate 1903. The ticket certificate issuing date 1929 is information providing the date on which the ticket certificate 1903 was issued.

[0912] The registered ticket certificate 1933 includes seven information items: a registered ticket certificate header 1934, a ticket ID 1935, a ticket signature public key 1936, a ticket certificate ID 1937, a certificate validity term 1938, a service provider ID 1939, and a ticket certificate issuing date 1940. A digital signature is provided for the ticket certificate 1933 by the service provider.

[0913] The registered ticket certificate header 1934 is header information labeling this as a registered ticket certificate and describing the data structure of the registered ticket certificate. The ticket ID 1935 is ID information for the electronic ticket 1900, and is the same information as that provided by the ticket ID 1906 and the ticket ID 1916.

[0914] The ticket signature public key 1936 is a public key that is paired with the ticket signature private key 1910 for use as the digital signature for the electronic ticket 1900. The paired ticket signature private key 1910 and ticket signature public key 1936 have greater lengths and provide greater security than do the paired ticket signature private key 1910 and ticket signature public key 1925.

[0915] In the ticket registration process, the paired ticket signature private key 1910 and ticket signature public key 1925 used as the digital signature for the electronic ticket are updated to the new, more secure paired ticket signature private key 1910 and ticket signature public key 1936.

[0916] The ticket certificate ID 1937 is ID information for the registered ticket certificate 1933. The certificate validity term 1938 is information concerning the term during which the registered ticket certificate 1933 is valid. The service provider ID 1939 is ID information identifying the service provider who issued the registered ticket certificate 1933. The ticket certificate issuing date 1940 is information concerning the date on which the registered ticket certificate 1933 was issued.

[0917] The ticket certificate does not constitute information for certifying the electronic ticket 1900, but instead constitutes information with which the service provider certifies the ticket signature public key 1925 (or the ticket signature public key 1936). The ticket certificate is added to the message accompanied by the digital signature for which the ticket signature private key 1910 is used, so that the legality of the message can be verified.

[0918] When the electronic ticket is purchased or transferred, the ticket status 1907 for the electronic ticket is in the disabled state. To set the ticket status 1907 to the enabled state, the electronic ticket must be registered in the service providing system 110.

[0919] When the service providing system 110 separately manages an electronic ticket to be used and an electronic ticket that is unused and is in the sleeping state, the operating cost of the electronic ticket service is reduced, and the illegal use of the electronic ticket is prevented by changing, during the registration process, the digital signature keys for the electronic ticket.

[0920] When the electronic ticket is registered, the ticket status 1907 represents the enabled state. The ticket signature private key 1910 is changed to a new ticket signature private key, and accordingly, the ticket certificate 1903 is changed to the registered ticket certificate 1933. Further, in the service providing system 110, the electronic ticket is registered in the service director information server 901 as an electronic ticket that is to be used by the user who registered the ticket.

[0921] Fig. 20 is a specific diagram showing the data structure of an electronic payment card 2000. In Fig.

20, the electronic payment card 2000 consists of three portions: a payment card program 2001, a presentation card 2002 and a card certificate 2003 or 2033 portion. The payment card program portion is information for managing the status of a payment card and for specifying an operation inherent to a payment card. The presentation card portion is information that is to be presented to the merchant terminal 102 (or the merchant terminal 103 or the automatic vending machine 104) as information for the contents of a payment card for the settlement of a payment using an electronic payment card. The card certificate is issued by a service provider for an electronic payment card, and indicates that the electronic payment card is authentic. There are two types of card certificates: a card certificate 2003 for simply certifying an electronic payment card, and a registered card certificate 2033 for certifying that an electronic payment card is registered in the service providing system. The card certificate 2003 can be changed to the registered card certificate 2033 when the user registers an electronic payment card.

[0922] One electronic payment card, as well as one electronic ticket, includes three key types and four different keys in accordance with the public key cryptography method. One key type is a key used for a digital signature accompanying an electronic payment card, and a card signature private key 2010 and a card signature public key 2025 (2036) are provided as a private key and a corresponding public key. Another key type is a card private key 2011 used for the electronic payment card authorization process performed with the merchant terminal 102 (or the merchant terminal 103 or the automatic vending machine 104). The other key type is an accounting machine public key 2012 used for the authorization process for the merchant terminal 102 (or the merchant terminal 103 or the automatic vending machine 104) performed by the mobile user terminal 100.

[0923] The card signature private key 2010 and the card signature public key 2025 (2036) are a key pair that differs for each electronic payment card. The card private key 2011 and the accounting machine public key 2012 differ for each payment card type. The merchant terminal 102 (or the merchant terminal 103 or the automatic vending machine 104) includes a card public key and an accounting machine private key that correspond to the card private key 2011 and the accounting machine public key 2012. The method for employing these keys will be described in detail later.

[0924] In Fig. 20, first, the payment card program 2001 includes ten items of information: payment card program header 2004, card name 2005, card ID 2006, card status 2007, total remaining value 2008, micro-check issuing number 2009, card signature private key 2010, card private key 2011, accounting machine public key 2012 and payment card program data 2013 information.

[0925] The card program header 2004 is header information indicating that the entry is a payment card program and describing the data structure of the payment card program. The card name 2005 and the card ID 2006 are the name and the ID of an electronic payment card. The card ID is identification information that differs for each electronic payment card.

[0926] The card status 2007 is information describing the status of an electronic payment card, concerning whether the electronic payment card can be used, whether it is unused, whether it has been registered, and whether it can be transferred.

[0927] A remaining card amount 2008 is information providing the remaining amount that is held by the electronic payment card.

[0928] The micro-check issuing number 2009 is the issue number for a micro-check that is issued by an electronic payment card, and is incremented each time a micro-check is issued. For each electronic payment card, an arbitrary number is set as the initial number that is employed as the micro-check issue number. The initial number is managed by the service providing system 110, and is employed as verification data in the micro-check reference process. The micro-check reference process will be described in detail later.

[0929] The card signature private key 2010 is a digital signature private key for the electronic payment card 2000. Similarly, the card private key 2011 is used for the authorization process for the electronic payment card 2000, and the accounting machine public key 2012 is used for the authorization process for the merchant 102 (or the merchant 103 or the accounting machine 104).

[0930] The card signature private key 2010 is used, in the payment card clearing process and the payment card transfer process, to provide a digital signature for data consisting of the card status 2007 and the total remaining value 2008 for the electronic payment card 2000 in the merchant terminal 102 (or the merchant

103 or the automatic vending machine 104) or the mobile user terminal to which the electronic payment card is transferred.

[0931] The card program data 2013 is a program module for specifying an operation inherent to the electronic payment card.

[0932] The program module for specifying a common operation for the electronic payment card is stored in the ROM 1501. The basic operations, such as the exchange of messages with the merchant terminal 102 (or the merchant terminal 103 or the automatic vending machine 104) to clear a micro-check, the generation of messages to be exchanged and the updating of the card status 2007, and the standard format for the display of an electronic payment card on the LCD 303, are defined by the program module that is stored in the ROM 1501.

[0933] The card program data 2013 is a program module for specifying the operations inherent to the payment card clearing process and inherent to the display process. The card program data 2013 consists of three data sets: a transaction module set 2030, a representation module set 2031 and a representative component information set 2032.

[0934] The transaction module 2030 is a program module for specifying an operation inherent to the payment card settlement processing. Since the transaction module 2030 is specified, in the payment card settlement processing, messages can be exchanged among the procedures that differ from normal, or inherent information can be included in a message to be exchanged.

[0935] The transaction module 2030 does not have to be specified if this is not required. When the transaction module 2030 is not defined, it acts as an electronic payment card for the performance of the basic payment card clearing process.

[0936] The representation module 2031 is a program module for specifying an operation on the display, such as a location on the LCD 303, data to be displayed and a display form. The representation module 2031 also does not have to be defined if such is not necessary. When the representation module 2031 is not defined, an electronic payment card is displayed in the standard display format.

[0937] The representative component information 2032 is image information comprising a component of a payment card on the display, such as an illustration, a photo, a map or a background image. The representative component information 2032 does not have to be specified if such is not necessary. When the representative component information 2032 is not specified, the electronic payment card is displayed using only with text information, as is shown in Fig. 3D. When the representative component information 2032 is specified, the electronic payment card is displayed using the standard display format. When the representation module 2031 is specified, the image information included in the representative component information is displayed as an image 314 in accordance with the representation module 2031, as is shown in Fig. 3G.

[0938] The operations attributable to various types of payment cards, and the design of an electronic payment card having a high degree of freedom can be specified by a combination consisting of the transaction module 2030, the representation module 2031 and the representative component information 2032.

[0939] The presentation card 2002 includes eight information items: a presentation card header 2014, a card code 2015, a card ID 2016, card information 2017, a payment card issuer ID 2018, a validity term 2020, a service provider ID 2021, and a card issuing date 2022. A digital signature is provided for the card ID 2016, the card information 2017 and the card issuer ID 2018 by the card issuer (2019), and a digital signature is provided for the presentation card 2002 by the service provider.

[0940] The presentation card header 2014 is header information indicating that the pertinent card is a presentation card and indicating the data structure of the presentation card. The card code 2015 is code information indicating an electronic payment card type. And the card ID 2016 is ID information for an electronic payment card, and is the same information as that given for the card ID 2006.

[0941] The card information 2017 is ASCII information that indicates the contents of a payment card. In the card information 2017, a face value of a payment card when it is issued, usage condition information, an issuer, and information as to whether an electronic payment card can be transferred, are described using a

form to which tag information are added to represent the individual information types. When the standard display format or the representation module 2031 is designated, the card information 2017 is displayed on the LCD 303 in accordance with the representation module 2031, as is shown in Fig. 3D or 3G.

[0942] The card issuer ID 2018 is ID information that identifies the payment card issuer who issued the pertinent payment card. The validity term 2020 is information concerning the period the electronic payment card 2000 is valid. The service provider ID 2021 is ID information for the service provider. And the payment card issuing date 2022 is information concerning the date on which the service provider issued the electronic payment card 2000.

[0943] The card certificate 2003 and the registered card certificate 2033 have substantially the same data structure.

[0944] The card certificate 2003 includes seven information items: a card certificate header 2023, a card ID 2024, a card signature public key 2025, a card certificate ID 2026, a certificate validity term 2027, a service provider ID 2028, and a card certificate issuing date 2029. A digital signature is provided for the card certificate 2003 by the service provider.

[0945] The card certificate header 2023 is header information labeling this as a card certificate and describing the data structure of the card certificate. The card ID 2024 is ID information for the electronic payment card 2000, and is the same information as that provided by the card ID 2006 and the card ID 2016.

[0946] The card signature public key 2025 is a public key that is paired with the card signature private key 2010 for use as the digital signature for the electronic payment card 2000. The card certificate ID 2026 is ID information for the card certificate 2003. The certificate validity term 2027 is information indicating the period during which the card certificate 2003 is valid. The service provider ID 2028 is ID information for identifying the service provider who issued the card certificate 2003. The card certificate issuing date 2029 is information providing the date on which the card certificate 2003 was issued.

*[0947] The registered card certificate 2033 includes seven information items: a registered card certificate header 2034, a card ID 2035, a card signature public key 2036, a card certificate ID 2037, a certificate validity term 2038, a service provider ID 2039, and a card certificate issuing date 2040. A digital signature is provided for the registered card certificate 2033 by the service provider.

[0948] The registered card certificate header 2034 is header information labeling this as a registered card certificate and describing the data structure of the registered card certificate. The card ID 2035 is ID information for the electronic payment card 2000, and is the same information as that provided by the card ID 2006 and the card ID 2016.

[0949] The card signature public key 2036 is a public key that is paired with the card signature private key 2010 for use as the digital signature for the electronic payment card 2000. The paired card signature private key 2010 and card signature public key 2036 have greater lengths and provide greater security than do the paired card signature private key 2010 and card signature public key 2025.

[0950] In the payment card registration process, the paired card signature private key 2010 and card signature public key 2025 used as the digital signature for the electronic payment card are updated to the new, more secure paired card signature private key 2010 and card signature public key 2036.

[0951] The card certificate ID 2037 is ID information for the registered card certificate 2033. The certificate validity term 2038 is information concerning the term during which the registered card certificate 2033 is valid. The service provider ID 2039 is ID information identifying the service provider who issued the registered card certificate 2033. The card certificate issuing date 2040 is information concerning the date on which the registered card certificate 2033 was issued.

[0952] The card certificate does not constitute information for certifying the electronic payment card 2000, but instead constitutes information with which the service provider certifies the card signature public key 2025 (or the card signature public key 2036). The card certificate is added to the micro-check accompanied by the digital signature for which the card signature private key 2010 is used, so that the legality of the micro-check can be verified.